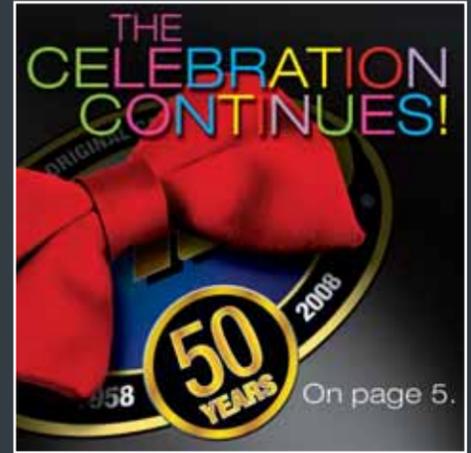


Electrical Business

THE AUTHORITATIVE VOICE OF CANADA'S ELECTRICAL INDUSTRY



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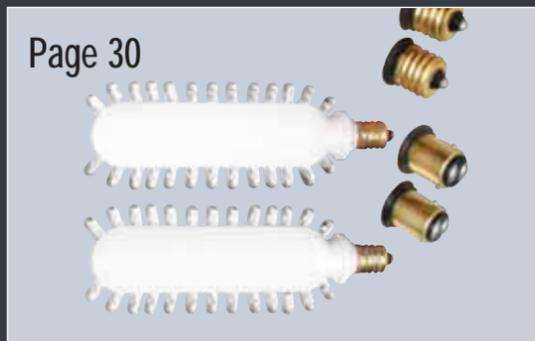
New all-metal fixture box is a one-piece unit, no assembly required, that ships ready-to-install on a 24-in. suspended ceiling grid.

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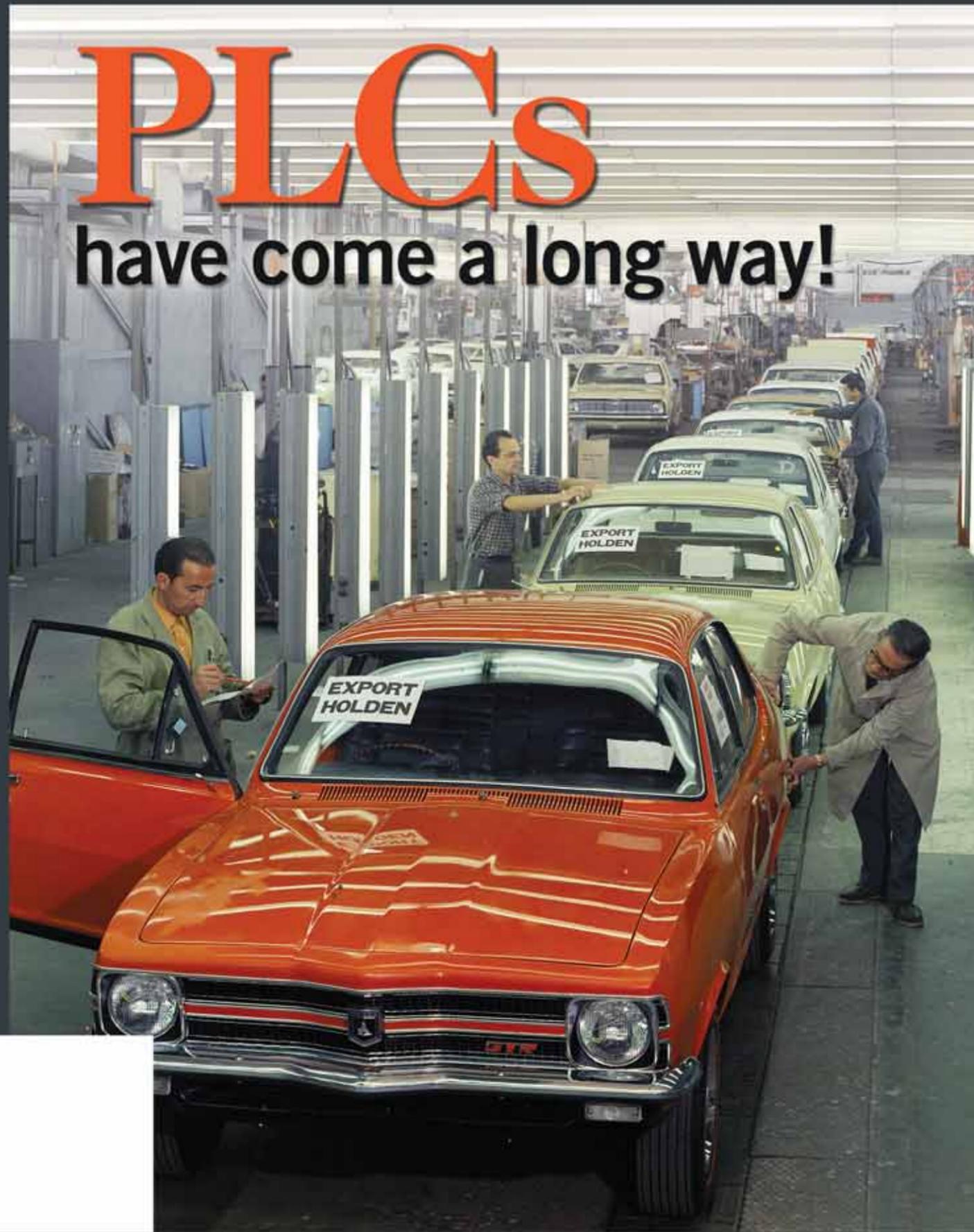


New programmable controller is designed for industrial and commercial machines.

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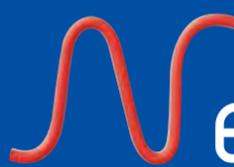


LED replacement for incandescent exit lamps.

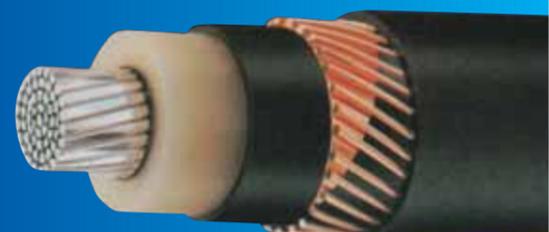


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From the editor ▼



“Why do we build dumb buildings?”

With this question, Ron Zimmer opened his discussion at the latest EEMAC Lunch 'n Learn on “Intelligent and Sustainable Building Automation”. Zimmer was the keynote speaker at the Electrical Equipment Manufacturers Association of Canada event; he's the president and CEO of the Continental Automated Buildings Association (CABA), a non-profit association dedicated to providing information, education and networking opportunities relating to home and building automation.

He's been at this for a good many years, trying to spread the “good news”, if you will, about the importance of intelligent and sustainable buildings. You see, CABA is involved in all kinds of research projects, and networks with numerous organizations, and it's learned that, when it comes to the built environment (i.e. homes, schools, hospitals, airports, commercial office space, and so forth), buildings are the biggest electricity hogs.

And here in North America we've been pretty lucky when it comes to energy availability and pricing, but the honeymoon is over. With the price of a barrel of oil now over \$100 US, owners are starting to more seriously consider the importance of integrated, sustainable design... not because of some lofty, environmentalist ideals, but because it makes good business sense for the bottom line.

Essentially, it goes back to the question posed at the top: “Why do we build dumb buildings?” Our buildings should take advantage of modern technologies to become lean, energy-efficient machines, rather than bloated, redundant wasteful spenders. A building automation system, and all its components,

regulates and maximizes the surrounding environment with incoming energy for the comfort of building occupants and the success of the owner's bottom line.

An integrated building automation system (BAS), as pointed out by Zimmer, can adjust lighting levels and window screening to maximize natural light from the sun while minimizing the load on electrical light fixtures, dimming them appropriately based on their distance from that natural sunlight. An integrated BAS also ropes into the same fold security, video monitoring, access control, HVAC requirements, and the like to keep everything running at peak performance without waste.

Other parts of the world are creating marvels with their automated buildings (granted, it's new construction... retrofitting North America's existing building stock is expensive and onerous, so we shouldn't be too hard on ourselves), and we should be doing more to point owners in the right direction for helping their bottom line.

Increasingly, they—along with architects and engineers—understand the relevance of automated building. More of them are considering purchasing new—or upgrading existing—systems with the goal of operational efficiency and reduced costs. And they'll need experts to make it all work. Make sure you're part of that solution. **EB**

Anthony Capkun

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Photo © General Motors and Wiecek Media Services Inc.

18 Understanding programmable logic controllers

Programmable logic controllers have come a long way since General Motors took delivery of the world's first PLC. In fact, PLCs were developed in the 1960s in response to problems plaguing the automotive industry. These days, these wondrous electrical devices are, in fact, highly specialized computers designed to control machines and industrial processes automatically. Thankfully, professionals wishing to enter this lucrative field need not be computer engineers, but rather accomplished electricians with good computer skills.

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6 Regional Focus

Yukoners encouraged to register electrical products, recommendations for Manitoba's apprenticeship system, website improves access to B.C. labour data, New Brunswick to improve worker skills, P.E.I. succession planning at its best, Nova Scotia issues alert for linemen's fall protection, Ontario budget invests in skills training, and more.

22 Integrating motion and logic helps reduce automation costs

Integrating motion and logic in a drive is the way to achieve the flexibility and scalability today's fast-changing production environments require. As OEMs strive to create high-performance low-cost machines, and end-users in the packaging industry push to keep a lid on capital expenditures, the distributed intelligence solution provides an innovative path forward.

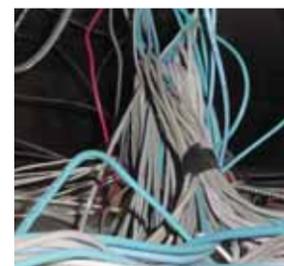


24 Considerations for effective emergency alarm systems in the workplace

An emergency evacuation of their workplace is not something most employees consider as they go about their usual day. Yet, when events arise requiring evacuation or some other emergency action, employees must be able to recognize the emergency situation and follow the established procedures that result in the quick and orderly response that assures the safest possible outcome.

27 Structured cabling for your lasting connection

What is data worth to a company? Over 70% of network outages and hiccups are cabling related, yet we fail to fully recognize the perils associated with a less-than-judicious approach to cabling selection and installation. The success of a business, therefore, is very much tied to its ability to process and transmit information efficiently and without any latency.



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IEEE approves faulted circuit indicators standard; revises power cable standards

The IEEE has approved a new standard, IEEE 1610T, "Guide for the Application of Faulted Circuit Indicators for 200/600A, Three-Phase Underground Distribution". This guide provides information on what a faulted circuit indicator (FCI) is designed to do and describes methods for selecting FCIs for three-phase, 200A/600A underground distribution circuits.

IEEE has also revised two standards related to high- and medium-voltage power cables. IEEE 592T, "Standard for Exposed Semiconducting Shields on High-Voltage Cable Joints and Separable Connectors", revises the standard from 1990. The standard provides design tests for shield resistance and a simulated fault-current initiation for exposed semiconducting shields used on cable accessories—specifically joints and separable insulated connectors rated 15 kV through 35 kV.

The other revised standard is IEEE 1407T, "Guide for Accelerated Aging Tests for Medium-Voltage (5kV-35kV) Extruded Electric Power Cables Using Water-Filled Tanks"—a standard previously approved in 1998. The implementation of this guide will allow a better description of the test data obtained by different laboratories.

Distributors at risk with private label, counterfeit products

As electrical distributors increasingly consider selling private-label products and products manufactured offshore, they face more serious risks of being held liable for damages caused by these products.

That, according to a new research report from the NAED Education & Research Foundation, "Product Liability Exposure: How to Manage and Mitigate the Risks in Today's Global Market" (which was selected and funded by NAED's

Channel Advantage Partnership [CAP] endowment). The report analyzes current liability threats and suggests steps that distributors should take to manage and mitigate risk.

Based on interviews with distributors and a review of available literature and information, the study finds that private labelling is on the increase. (Private labelling is appealing because such products can generate 20% to 50% incremental profit margin, the report says.)

"While its potential for profitability is attractive, the risks attendant to private labelling, especially with products manufactured in foreign countries, can be significant. In fact, the electrical products with the highest number of private labels are also those that have been the subject of recent recalls by the U.S. Consumer Product Safety Commission," warns the report.

Examples of such products include electrical tape, connectors and fittings, wiring devices, circuit breakers and recessed lighting. The major private-label source is China, which supplies 38% of private-label electrical products and components.

A related problem is the growing incidence of counterfeit products. Whether a distributor knowingly or unknowingly sells a counterfeit product, the company can face, not only civil liability, but also criminal penalties. Distributors also can face liability from providing value-added services, such as repackaging, installation and instructions.

Under U.S. product liability laws, distributors can be required to pay the full amount of personal injury and property damage caused by electrical products, while the manufacturer or supplier escapes responsibility, the report says. Under the legal principle of "joint and several liability", injured parties can recover the entire amount of their damages either from all of the parties found liable or from just one of them, regardless of the respective share of liability.

"In cases where other parties, such as manufacturers, are unable to pay their share, have no insurance coverage avail-

able, or are not subject to suit in the United States, wholesalers can be responsible for 100% of the judgment, thus taking on the risks and exposures and standing in the shoes of the manufacturer," the report says, adding that managing product liability exposures must be both a priority and an essential component of every electrical distributor's strategic and tactical operation.

The report makes several key recommendations for managing and mitigating the risks:

- Undertake an independent evaluation by experts to assess potential exposures from products sold and services provided.
- Examine contracts and agreements with manufacturers to ensure the strongest and best protection.
- Ascertain manufacturers and their insurers' ability and willingness to defend and indemnify wholesalers against claims and lawsuits.
- Perform due diligence and deal only with trusted suppliers and manufacturers.
- Evaluate value-added services and written/oral representations to customers to determine whether they add to risk.

Schneider and ELAU to assist packaging machinery OEMs

Schneider Electric launched a new technology centre focused exclusively on the automation, control and power needs of the packaging machinery business. The Packaging Technology and Solutions Center (PTASC) combines resources from Schneider Electric subsidiary ELAU Inc. (a player in purpose-built packaging automation solutions) with experts from Schneider's existing Raleigh, N.C.-based OEM Technology and Solutions Center.

Headquartered in Schaumburg, Ill., the PTASC features an application lab where customers can visit to work hand-

PHOTO CONTEST



Electrical Business, in association with the Electrical Heritage Society of British Columbia—along with generous industry partners—is excited to present the Heritage "What Am I?" PHOTO CONTEST.



Pictured at left is an item from the heritage society's collection of electrical artifacts. The contest begins when you think you know what this item is. Of course, we're not going to show the item in its entirety—that would be too easy! (You'll have to wait until next month to see the whole picture, as well as the correct answer.)

Here's how to play

Visit EBMag.com where you'll find "Electrical Business Photo Contest" right on the home page. This will take you to the online reporting form, where you'll find an entry form along with a multiple choice answers from which to choose (as well as the official contest rules). If you've answered correctly, your name will be added to all the other correct entries, from which one (1) winner will be randomly chosen before next month's installment of "The Heritage What Am I?". Read the small print below for more information. Good luck!

This month's awesome prize!



This month's awesome prize was donated by our friends at DeWALT. The D28770 heavy-duty deep cut variable speed band saw boasts a powerful 6-amp motor designed to withstand any jobsite application, and a 4-3/4-in. deep cut capacity for round or rectangular stock. A lightweight and well-balanced design allows for more accurate cuts, while rubber bumpers protect the casting from jobsite abuse. Externally replaceable brushes allow for quick repairs on the jobsite, and a speed control knob allows you to tailor the blade speed for various applications. Meantime, the integrated hang hook allows you to hang the tool so as not to damage the front handle or castings.

Last month's photo: answer

Pictured here is a **crystal radio receiver** (a.k.a. Crystal Radio Set). This simple radio receiver uses radio waves for power. Winner to be announced.



No purchase necessary. Open to residents of Canada of age of majority, excluding Quebec. You must answer a timed skill-testing question to win. Prize valued at about \$450.00. The contest is not open to anyone affiliated with, or related to, members of Electrical Business or the Electrical Heritage Society of British Columbia. (That would be unfair.)

in-hand with Schneider and ELAU engineers to design full machine solutions. The centre also boasts a 12-seat training facility with fully functional test stands to allow customers to learn about the latest hardware and software solutions through interactive classroom training.

“Nela On The Road” comes to Canada

Known around the world as one of the foremost lighting and electrical distribution training facilities, GE’s Lighting and Electrical Institute (which has served industry for more than 70 years from GE’s historic Nela Park Campus in Cleveland, Ohio) is taking its show on the road.

“Nela On The Road” will tour Canada, hosting a series of GE Lighting Learning Days that cover everything from basic product and application training for commercial and industrial lighting to environmentally responsible strategies, GE ecomagination products and more. This is a unique educational opportunity for facility managers and engineers, owners, energy management specialists, distributors and other end-users to learn more about lighting and reducing energy consumption.

To participate, pre-register for the event nearest you at www.nelaontheroad.com. Attendance is on a first-come, first-served basis.

Counterfeiting and copyright piracy reality tour

The 2008 CACN Reality Tour is a cross-country educational initiative of the Canadian Anti-Counterfeiting Network (CACN) and the Royal Canadian Mounted Police (RCMP) aimed at raising awareness of product counterfeiting and copyright piracy in Canada, and educating police, customs, prosecutors, regulatory personnel, students, consumers and government officials on ways of combating the problem.

Presentations and meetings are organized in nine cities across Canada leading up to the 2008 International Law Enforcement IP Crime Conference hosted by the RCMP and Interpol in Halifax, N.S., June 24 to 26. For more information, visit EBMag.com’s Calendar.

Sola/Hevi-Duty changes name to SolaHD



Sola/Hevi-Duty has changed its name to SolaHD. Complete with a re-designed logo, the company says the new identity signifies its mission of providing a more comprehensive line of power quality solutions for industrial facilities worldwide through extensive research and new technologies. It adds that the new name also better communicates the SolaHD promise to customers to improve efficiencies, preserve data and increase equipment longevity.

SolaHD products include surge protective devices, power conditioners, transformers and power supplies that compose and support power throughout branch distributions. In addition, SolaHD offers line reactors, power supplies and uninterruptible power supplies (UPS) to control voltage to sensitive computer and production line equipment.

Illumisys and State of Michigan partner in SSL research

Illumisys Inc. will begin working with the State of Michigan to provide light-emitting diode (LED) replacement lighting for fluorescent tubes and collect research data in the state’s Escanaba office building. Over a four-year period, Illumisys will install three successive generations of LED lighting, each to replace 200, 4-ft long fluorescent tubes—about 25% of those in the two-storey, 31,000-sf building.

With each successive generation of product expected to be more energy efficient and offer additional improvements and features, the state and Illumisys will collect and share research data during each phase. **EB**

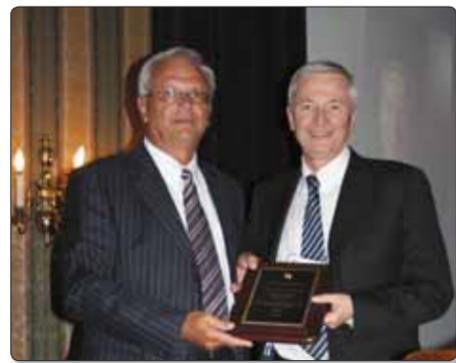


Jim Osterbrock

Pass & Seymour/Legrand (P&S), a provider of electrical wiring devices, accessories and home systems, has named **Jim Osterbrock** vice-president of engineering. In his new role, Osterbrock will be responsible for driving innovation through new product and technology development, as well as product and packaging design and product testing.

“Jim’s previous experiences as director of engineering and director of marketing make him ideally suited for this position,” said **Pat Davin**, vice-president and general manager at P&S.

Fluke Electronics Canada (FEC), a player in compact, professional electronic test tools, announced that **Robin Bricker** has been appointed marketing manager, reporting to the president of Fluke Electronics Canada LP. She is responsible for marketing planning and communication for all product divisions within FEC, including Fluke Industrial Group, Fluke Precision Measurement and Fluke Networks (and associated brands under those product groups). “Robin brings a wealth of industry knowledge and a proven track record with over 12 years experience working with Fluke on the marketing communications agency side,” said **David Green**, director of marketing, AMPAC Regions.



William (Bill) P. Buckley, P.Eng., EFC’s 2008 Industry Recognition Award recipient (at right).

Electro-Federation Canada (EFC) announced this year’s Industry Recognition Award (IRA) recipient: **William (Bill) P. Buckley, P.Eng.**, president and CEO of ShawCor Ltd. Buckley has logged over 38 years in the Canadian electrical industry, starting with a summer position during university when he worked for Ontario Hydro at Nanticoke and with the Bruce G.S. Turbine Group. In 1994, he served on EFC’s founding board, and as the group’s chair in 1997. EFC’s Industry Recognition Award honours individuals who have influenced the Canadian electrical, electronics, appliances or telecom industry either as a current or retired industry delegate, or as an industry supporter. **EB**

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Thomas & Betts



Toronto and Enbridge announce incentives for energy efficiency



(Left to right) Janet Holder, president, Enbridge Gas Distribution; Peter Love, Ontario's chief energy conservation officer, Ontario Power Authority; and Toronto's Mayor David Miller launch new energy conservation programs for buildings in Ontario.

The City of Toronto and Enbridge Gas Distribution announced the launch of two new conservation programs offered by the Ontario Power Authority (OPA) that will provide design assistance and financial incentives to encourage building owners and architects to include sustainable and energy-efficient features in new construction and major renovation projects across Ontario.

The Enbridge-delivered High Performance New Construction (HPNC) program and the City of Toronto's enhanced Better Buildings Partnership (BBP) program are part of a major conservation initiative offered by OPA. Each will contribute to OPA's overall mandate to promote electricity conservation and demand management throughout Ontario and soundly manage the province's current and near-term electricity supply.

The programs will provide assistance to include energy-efficiency measures in the design, construction and oper-

ation of new and substantially renovated buildings. These measures are designed to save energy through improved efficiency and peak demand management.

The City of Toronto's Energy Efficiency Office develops and implements programs that promote energy efficiency and offers two specific programs for Toronto buildings: the Better Buildings Partnership-Existing Buildings (BBP-EB) program for retrofits to existing buildings and the Better Buildings Partnership-New Construction (BBP-NC) program for new buildings being built to be more energy efficient.

With enhanced incentives for electricity conservation, the Better Buildings Partnership will contribute toward the city's goal of achieving 90 megawatts of electricity conservation (as part of the minister of energy's directive to OPA to achieve 300 megawatts of savings in Toronto by the end of the decade). The BBP will provide incentives up to \$400 per kilowatt saved to 2012, depending on the project's eligibility. Achieving the program's savings target of 90 megawatts could realize incentive payouts up to \$36 million.

Meantime, in addition to helping reduce future building energy costs, the HPNC program is expected to save 50MW of peak electricity demand in Ontario by 2012. Projects eligible for the program include offices, retail space, multi-unit residential buildings, affordable housing, colleges, universities, schools, hospitals, long-term care facilities, hotels and other commercial and industrial buildings. Single-family dwellings are not eligible. Projects must be completed and delivering energy savings by the end of 2012.

The program also offers financial incentives for qualifying buildings exceeding the Model National Energy Code for Buildings. Up to \$400/kW saved will be available to building owners and up to \$100/kW saved to architects for eligible new projects. The program could deliver almost \$18 million in incentives to Ontario building owners and architects.



A new agreement to help New Brunswick workers improve their skills and prepare them for jobs of the future was signed by Ed Doherty, N.B.'s post-secondary education, training and labour minister, and Monte Solberg, minister of human resources and social development. (In photo) standing: Greg Thomson, minister of veterans affairs, and Mary Schryer, minister of social development. Seated: Ed Doherty and Monte Solberg.

New Brunswick to improve worker skills

A new agreement to help New Brunswick workers improve their skills and prepare them for jobs of the future was signed today by Ed Doherty, post-secondary education, training and labour minister, and the federal minister of human resources and social development, Monte Solberg.

"This agreement provides the flexibility we need to more effectively develop our workforce and achieve our goal of self-sufficiency," said Doherty. "It demonstrates the high priority that this government places on skills development to transform our workforce, as reflected in the Charter for Change. We want to make the best use of the skills and talents of all New Brunswickers so that they can contribute to our economy and be successful in New Brunswick."

Through this agreement, residents of New Brunswick who are not eligible for training under the Employment Insurance (EI) program will have a better chance to improve their skills. This funding will be used to partner with employers to dramatically improve the adult literacy rate of the province's workforce. It may also help individuals move from low-skilled work to better jobs in such occupations as construction.

Unemployed New Brunswickers who are not eligible for training assistance under EI will also benefit from these investments. This includes groups such as Aboriginals, immigrants and persons with disabilities who are under-represented in the labour market.

"Now more people in New Brunswick will be able to get the employment and skills development programs they want, and at the same time the agreement will help fill gaps in the skilled labour market," Solberg said. "The federal government is committed to helping people who work hard, pay their taxes and play by the rules. With this agreement, our economic plan will continue to pay dividends for families in New Brunswick."

Under the agreement, over \$68 million will be injected into New Brunswick's labour market over the next six years (based on current population estimates), beginning with an investment of \$11.4 million in 2008-09. Under these arrangements, the new resources will also help to provide training for employed individuals who are low-skilled and do not have a high-school diploma or a recognized credential, or have low levels of literacy and lack essential skills.

The new Canada-New Brunswick labour market agreement came into effect April 1, and complements the Labour Market Development Agreement signed between the Government of Canada and New Brunswick in 1996, under which the province assumed responsibility for designing and delivering employment programs and services for unemployed people eligible under the EI program.

Recommendations for Manitoba's apprenticeship system

Andrew Swan, Manitoba's competitiveness, training and trade minister, recently received the consensus report of the Apprenticeship Futures Commission on modernizing and expanding Manitoba's apprenticeship system to better meet the needs of the province's growing labour market.

"I will be looking closely at their suggestions for updating and expanding the apprenticeship system in forthcoming weeks in order to attract more workers to the program and increase the availability of skilled labour to meet the growing demand," he said.

The 12-member committee, chaired by Leonard Harapiak, consulted with the public and stakeholders regarding existing apprenticeship and related training, as well as certification systems, to identify opportunities and challenges with respect to meeting the changing needs of the Manitoba labour market.

The report provides 22 recommendations, including:

- increasing the capacity of the technical training system to meet the projected need for skilled tradespeople, including better partnerships with the public school system;
- creating a comprehensive public promotion and education campaign about apprenticeship in the

province of Manitoba;

- exploring the introduction of a variety of incentives to encourage increased employer participation in the apprenticeship system;
- enhancing the financial support to apprentices during in-school training, and pursuing discussions to significantly reduce the waiting period for apprentices;
- significantly increasing the participation of under-represented groups in the apprenticeship system (i.e. Aboriginal people, new Canadians, etc.); and
- reviewing existing provincial legislation and regulations to support the growth of technical training spaces.

The minister noted the province will continue to work with its partners, including employers, government educational institutions and employees, to increase opportunities for young people in the trades.

"A highly-skilled workforce is vital to Manitoba's economic prosperity," said Swan, adding, "These recommendations will allow us to build on our accomplishments, including a 65% increase in apprenticeships since 1999, and will help us meet our commitment to add an additional 4000 apprenticeship training spaces over the next four years."

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PEI Business Development will provide five-year, interest-free loans to enable participants to purchase a minimum of 10-25% of the shares in an existing business. “These loans will give young entrepreneurs access to equity that they may have difficulty acquiring on their own,” said Richard Brown, minister of development and technology. “This program will also address the needs of business owners who are looking for someone to take over when they retire. It’s addressing the needs of both young entrepreneurs and the business community.”

“The Adopted Son or Daughter Program’ was developed by local businessperson and UPEI entrepreneurship professor Mike Cassidy. “The biggest problem we have in entrepreneurship is: Does the person stepping into a business really understand the business? Do they know how to operate the business on a daily basis?” said Cassidy. “This program allows the young person to gain valuable experience and equity in the business. The young entrepreneur has to keep in mind the concept of ‘work to learn’, not ‘work to earn’, and the benefits of long-term gain.”

Dr. Roberta MacDonald, dean of the UPEI School of Business, is excited about the program and believes it fills a need within the province. “We have many young people wanting to get into business knowing that experience and finance are two of the biggest challenges,” she said, adding that the program addresses both these issues.

Anyone wanting more information on the program can contact Joan Fleming at the UPEI School of Business, (902) 566-0975 or jofleming@upei.ca, or Brian Keefe, PEI Business Development, (902) 368-6300 or bwkeefe@gov.pe.ca.

P.E.I. succession planning at its best

A new business succession initiative aimed at encouraging entrepreneurship opportunities for people aged 34 years and younger has been developed by the UPEI School of Business and the P.E.I. Department of Development and Technology.

As a new initiative, ‘The Adopted Son or Daughter Program’ encourages youth to consider a career as an entrepreneur by removing such obstacles as financing, lack of experience and the need for ongoing mentoring. In addition, many Island business owners are looking to reduce their workload or retire, and are currently contemplating options to begin the process of ownership change.

Website improves access to B.C. labour data

Employers, unions, researchers and the public now have instant access to the latest information on collective agreements in British Columbia, announced Olga Ilich, labour and citizens’ services minister.

Visitors to www.bcbargaining.ca can find information on the status of labour negotiations throughout the province and the latest data on settlements, expiring agreements, work stoppages and wages. The website is a result of collaboration between the Ministry of Labour and Citizens’ Services, the B.C. Federation of Labour, the Business Council of British Columbia and the Labour Relations Board.

“This website will contribute to a healthier collective bargaining environment because unions, employers and the public will have access to information on recent trends in bargaining and the labour market,”

said B.C. Federation of Labour president Jim Sinclair.

“Employers in B.C. will find valuable information on this site—credible information that will improve their entire labour relations process,” said Virginia Greene, president and CEO of the Business Council of British Columbia.

In addition to being a hub for labour relations information in British Columbia, the site also streamlines the reporting process to the Labour Relations Board. When submitting their collective agreement information to the website, employers and unions now also satisfy the requirement to file a copy with the board.

“The information will be invaluable in furthering the respectful, solution-oriented approach to labour relations which is being fostered in the province,” said Brent Mullin, chair of the Labour Relations Board.

Private-public partnership supports Alberta power research

Dr. Wilsun Xu is on a mission to bring information technology and Alberta’s power companies together to develop innovative solutions for the province’s power grid. As the newly appointed NSERC/iCORE Alberta Power Companies Industrial Research Chair in Power Quality, his success is both recognized and strengthened.

The Alberta government is partnering with the Natural Sciences and Engineering Research Council of Canada (NSERC) and the five-company Alberta Power Industry Consortium—through the Informatics Circle of Research Excellence (iCORE)—to fund Xu’s engineering and research projects at the University of Alberta. The five companies are the Alberta Electric System Operator (AESO), AltaLink Management Ltd., ATCO Electric Ltd., EPCOR and FortisAlberta Inc.

“Dr. Xu’s research will have a direct impact on Alberta’s power systems,” said Doug Horner, minister of advanced education and technology. “Dr. Xu, his team and the partners are bringing a new level of innovation to improving the efficiency and integrity of our power systems and enhancing the sustainability of both our environment and economy, something Albertans have told us they want.”

Xu explains: “A power system not only transmits energy to power industry processes but also integrates many forms of energy sources for efficient energy production and consumption. In Alberta, the electric power system has become increasingly important because of our massive development and rapidly increasing population, and it is imperative to provide reliable and quality power to support the growing provincial economy.”

He will lead a team of researchers in using modern information and communication technologies (ICT) to enhance the performance of the Alberta Integrated Electric System, thereby increasing the reliability and diversity of Alberta’s energy infrastructure.

“Coordinating the operation of a power system over a vast geographical area and with a wide variety of energy sources, in a secure manner, is a very complex and challenging informatics task that we believe Dr. Xu can help accomplish,” said Randy Goebel, president and CEO, iCORE.

Xu and his team are currently working on four projects in sensor network-based power grid decision support systems, three projects in intelligent devices for power system control and operation, and four projects in sustainable energy systems. “The value of this partnership is that the research being done is on real-world applications, specific to Alberta,” said EPCOR’s John Byron on behalf of the industry team. “The partnership gives researchers valuable experience, provides industry with applications that can be put to use, and facilitates innovations that will improve the electrical system benefiting all Albertans.”

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Yukoners encouraged to register electrical products

Yukon's chief electrical inspector, John Einarson, and fire marshal, Marty Dobbin, are teaming up to remind Yukon consumers to complete and mail the product warranty cards that come with new electrical and electronic products.

"The warranty card does much more than confirm when you bought something for service and repair purposes," Einarson said. "It also serves as a means for the manufacturer to contact consumers in case of product recalls due to faults discovered after purchase, resulting in potential risk to consumers."

A recent fire at a townhouse complex in Whitehorse caused by a defective toaster resulted in damage estimated at \$12,500, explained Dobbin. "A similar incident recently occurred in Porter Creek when a defective lamp malfunctioned and caused approximately \$250,000 in damage to a two-storey, wood-framed home, ruining most of its contents."

"Most manufacturers post recall notices on their websites, so if someone is unsure of products they own, they may be able to find service notices and recalls on these sites," Einarson said. "If consumers have questions related to product approval standards they can call the Chief Electrical Inspector's Office at (867) 667-5485."

Northern Saskatchewan students learn about the building trades

Donna Harpauer, Saskatchewan's social services minister, joined several La Loche high school students to celebrate the completion of a project that will help to meet affordable housing needs in their community. As part of their school curriculum, the students constructed a house to industry standards, gaining valuable experience in the building trades and providing a family with a new home.

"This is a wonderful approach to meet a housing need in this community and to encourage youth to consider the building trades as a career choice," Harpauer said.

"This construction partnership has created a very meaningful educational experience outside of the traditional classroom," said La Loche mayor, Georgina Jolibois. "It has allowed the students involved to build a meaningful skill set which can be used in their post-secondary education and in various parts of their own lives. We are pleased with this partnership and hope to include other government agencies and industries within the area."

Nine students at La Loche Community School built the home from start to finish while developing building trade skills such as work safety and construction techniques through teamwork. The new home will be rented to a low-income family through the La Loche Non-Profit Housing Corp.

The program is based on similar successful high school trade training initiatives in Regina and Saskatoon. In these programs, participating Grade 11 and 12 students built homes for low-income families. The students learned how to build a home and obtained credits in their school curriculums as part of the program.

Ontario budget invests in skills training

According to Ontario's government, the 2008 provincial budget will make major investments in skills training. Among the highlights is a \$1.5-billion, three-year Skills to Jobs Action Plan that promises to get more Ontarians into well-paying jobs and into long-term training for new job opportunities.

\$355 million of that will go into Second Career Strategy, which will help 20,000 unemployed workers make the transition to new careers and well-paying jobs in growing areas of the economy. For example, the Second Career Strategy would provide \$25,000 towards tuition and living allowance for a manufacturing worker who wants to move to a skilled-trades job and attends a four-semester, two-year Mechanical Technician program at a college. Also in the budget is \$75 million over the next three years to expand apprenticeship training.

The budget also contains money for infrastructure improvements, including \$100 million to rehabilitate social housing units, including energy-efficient improvements.

SaskPower upgrading Poplar River power station

To ensure the continued reliability of electrical service in the province, SaskPower has launched a \$140-million project to increase the output, reliability and efficiency of one of the generating units at the Poplar River Power Station near Coronach in south-central Saskatchewan.

"Poplar River Power Station will continue to be a key source of safe, reliable and economical electricity for the province, and this upgrade will ensure the continued reliable operation of this unit," said Ken Cheveldayoff, Crown corporations minister.

To allow for the upgrade, the unit shut down for 100 days on March 1. It is expected to be back online in early June. The upgrade project will replace worn-out boiler components with a new and improved design. SaskPower will also upgrade the existing turbine to improve efficiency, as well as replace the generator. Besides nearly doubling the unit's life expectancy and maintaining its viability for another 20 to 25 years, the project will increase the unit's output by 10 megawatts.

"Coal-fired units such as those at Poplar River Power Station are essential to our base load generation fleet," said SaskPower president Pat Youzwa said. "With much of SaskPower's equipment installed in the 1950s, 60s, 70s and 80s, the corporation carefully develops plans to maintain and upgrade its generation facilities. At the same time, we continue to focus on developing safe, reliable and sustainable sources of power for generations to come. SaskPower will continue its research into clean coal and carbon capture, as well as a number of other options under consideration."

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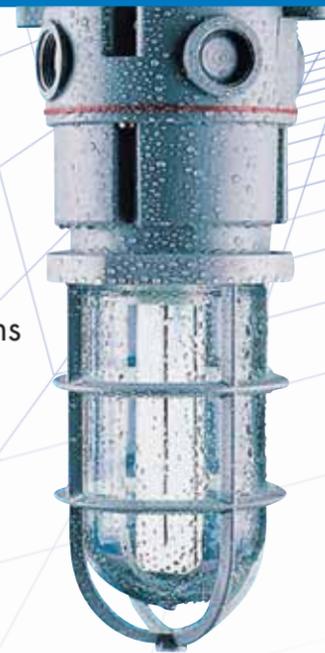
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Bonnyville and area students invited to join Alberta's trades

As part of an ongoing effort to encourage Alberta's junior and senior high school students to consider a career in the trades, a panel of local employers and apprentices spoke with students and their parents during a trades career information session in Bonnyville, Alta., in April.

"Youth, their parents, teachers and counsellors need to be more aware of the opportunities and rewards associated with a trade or occupational certificate," said Brian Bickley, chair of the Alberta Apprenticeship and Industry Training Board.

'Helping Students Find Their Place in the Trades' was launched by the training board as a commitment to increasing awareness about apprenticeship and trades careers. Since 2000, the board has visited Alberta communities promoting the value of apprenticeship training and the opportunities it provides for young people. Representing the electrical trade at the Bonnyville session was Clayton Shenher, an electrical apprentice.

\$1.4 million for B.C.'s Aboriginal and youth apprentices

British Columbia's Industry Training Authority (ITA) has awarded \$1.4 million to help increase Aboriginal and youth participation in industry training and apprenticeship programs, announced Colin Hansen, economic development minister, and ITA's CEO, Kevin Evans.

"This investment will make it easier for students to pursue their chosen career path in the trades," said Hansen. "By providing this financial support to encourage Aboriginal people and other youths to enter and complete industry training and apprenticeship programs, we are helping to meet B.C.'s need for skilled workers, both today and in the future."

The funding will be shared between two not-for-profit organizations. The Career Education Society (CES) receives \$1.1 million to help boost participation among grades 10-12 students in the Secondary School Apprenticeship (SSA) program. School districts will be eligible to receive funding of between \$15,000 and \$40,000 to encourage more students to continue their apprenticeship training after high school and become certified in their chosen fields.

Skills Canada BC receives \$300,000 to provide bursaries of up to \$5000 each to Aboriginal students who wish to attend a recognized pre-apprenticeship, foundation industry training program.

"We're excited about the potential for these programs proposed by the CES and Skills Canada BC as they will contribute measurably to our efforts to build the supply of skilled workers available to B.C. employers," said Evans. "They will reduce barriers to education and career success for two groups of British Columbians that are currently underemployed, even in today's strong economy."

More information is available on ITA's website at www.itabc.ca.



The Government of New Brunswick has received Team CANDU's feasibility study, which examines market demand for a second nuclear facility in the province. The government will now undertake a thorough review of the study, which will lead to a decision on the next steps the province may wish to pursue. From left: Energy Minister Jack Keir along with MZ Consulting's Terry Thompson and Milt Caplan.

Will New Brunswick develop a second nuclear reactor?

The Government of New Brunswick has received Team CANDU's feasibility study, which examines the market demand for a second nuclear facility in the province. The government will now undertake a thorough review of the study, which will lead to a decision on the next steps the province may wish to pursue.

"I look forward to reading this report and to the possibilities of what this could mean to our province and towards reaching our goal of self sufficiency," said Premier Shawn Graham. "When it comes to a growing energy hub that is truly making a major impact on the eastern seaboard, New Brunswick is the place to be."

The construction of a second nuclear reactor at Point Lepreau has the potential to create up to 4000 jobs during construction and 500 permanent, high-paying jobs to operate the facility. As well, it presents an opportunity for New Brunswick to develop a nuclear cluster around research, training, manufacturing and design.

In August 2007, the province hired a third-party consultant, MZ Consulting, to perform a viability study for a new nuclear facility in New

Brunswick. This study was independent from the Team CANDU feasibility study. It's a high-level study addressing key issues around market potential, project viability and the criteria required for a successful business venture. It assesses potential business models as well as broader issues outside the scope of the Team CANDU study.

The study undertaken by MZ Consulting has been reviewed and examined by the government, and energy minister Jack Keir is pleased to report on its findings and recommendations.

"I couldn't be happier after reviewing the positive results brought forward by our third-party consultants," Keir said. "A new nuclear reactor is viable under a certain set of conditions, and I look forward to reviewing the Team CANDU feasibility study to see if they have met those conditions. This is great news for the energy hub."

New Brunswick is the only province in Atlantic Canada licensed for operation of a nuclear power facility. The Point Lepreau nuclear generating station, which produces 630 megawatts of electrical power, is currently being refurbished at a cost of \$1.4 billion. **EB**

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By Dave Smith

Making our luck



When we're lucky, we're given the opportunity to learn from our mistakes before they cost us dearly. At the industrial level, unfortunately, it seems not only are we *not learning*, we are falling behind.

I have been teaching electrical safety courses since 1980 and, over two decades later, we're experiencing the same accidents—only with more violent results.

In one accident in 1982, an electrician died when he pulled a 600-volt fuse out of a loaded circuit. Just hearing that makes me shake my head. Every apprentice is drilled and grilled on the stupidity of that action. It is taught at tech. It is reinforced to the journeyman. It is embedded in our memory. Yet it continues to happen. Why?

There are many reasons, but two of the main ones are concentration (or lack thereof) and distractions. Sometimes, we are so busy concentrating on something else that we forget obvious and well-known dangers. (That's why troubleshooting is so bloody dangerous.) In the 1982 case, the accident was caused by the distraction of two co-worker electricians standing behind the victim. They were chit-chatting about something when, without saying anything and doing it so quickly that no one could have stopped him, the victim reeled out the fuse.

Had the victim attended an electrical safety course the day before and heard the instructor say, "Never pull a fuse under load", I can guarantee you he would have sat there thinking, "Yeah, tell me something I don't know".

So how do we stop these accidents—these tragedies—that are caused by people doing something they know they shouldn't? Were the situation not so serious, we could laugh about having our heads up our you-know-whats, but the situation *is that serious*: in this case, a guy lost his life, and one of the other guys was severely burned.

The problem continues, with dire results. Last year, the exact same accident happened—this time on a 480-volt system. One guy in front and, again, two guys standing behind him, chit-chatting. The difference is that, 25 years later, our busses are enormous with huge short-circuit current available.

This time the accident burned two of the electricians to death and caused severe burns to the third. It is guaranteed that all three knew never to pull a fuse under load.

We are all qualified, with years of training and experience behind us—yet accidents keep occurring. So how do we stop them?

We've all heard the joke about safety programs ("Don't move and nobody gets hurt"), but that's precisely the answer when it comes to working in and around an energized circuit: don't move until you are exactly, completely, 100% sure of what you are about to do and the resulting consequences.

And, when you're working with others, have a quick tail-gate meeting to make sure no one else makes a move before okaying it with the rest of the team.

Because of the unforgiving brutality of high-voltage accidents, the power companies have developed some of the most effective safety practices. One of the best is The Call System: before I make a move, I 'call out' to my co-workers, letting them know what I am about to do before I do it; then I make no further moves until I get the return call acknowledging and okaying my move. It is completely ingrained in everyone that safety comes first and no hand moves before the brain evaluates the movement.

In either of the aforementioned accidents, had the fuse-puller said, "I am about to pull this fuse out of the circuit", there would have been instantaneous argument accompanied by some colourful and imaginative cussing. Ultimately, the act would not have been completed.

Both of these accidents—three deaths and three serious burn injuries—could have been prevented with this safe work practice.

Take a harsh look at your safety program: do you have communication procedures in place to prevent these accidents? When you are next on the job and working with co-workers, do you evaluate the detail of your communication to prevent accidents? If not, improve your system.

And, last but not least, have you adopted the PPE requirements of NFPA 70E so that, should an accident occur, there are no deaths and any ensuing injuries are minimal? We are in the 21st Century; let's use our 21st Century tools and end these 20th Century accidents.

Until next time, be ready, be careful and be safe. **EB**

Dave Smith is president of Canada Training Group and has been providing consulting services to industry since 1980. This story and others can be found at www.canada-training-group.ca. Please feel free to use this information to support your safety program. Dave can be reached at davesmith@canada-training-group.ca.

T&B monthly tips



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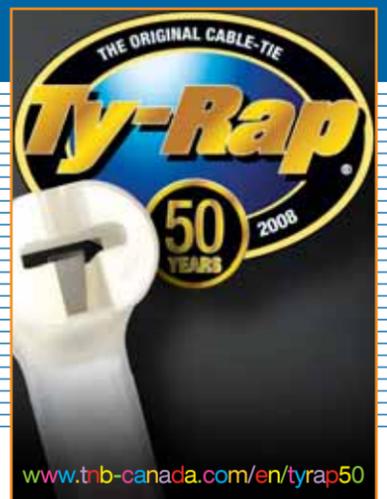
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Getting yourself clear of The Complacency Plateau

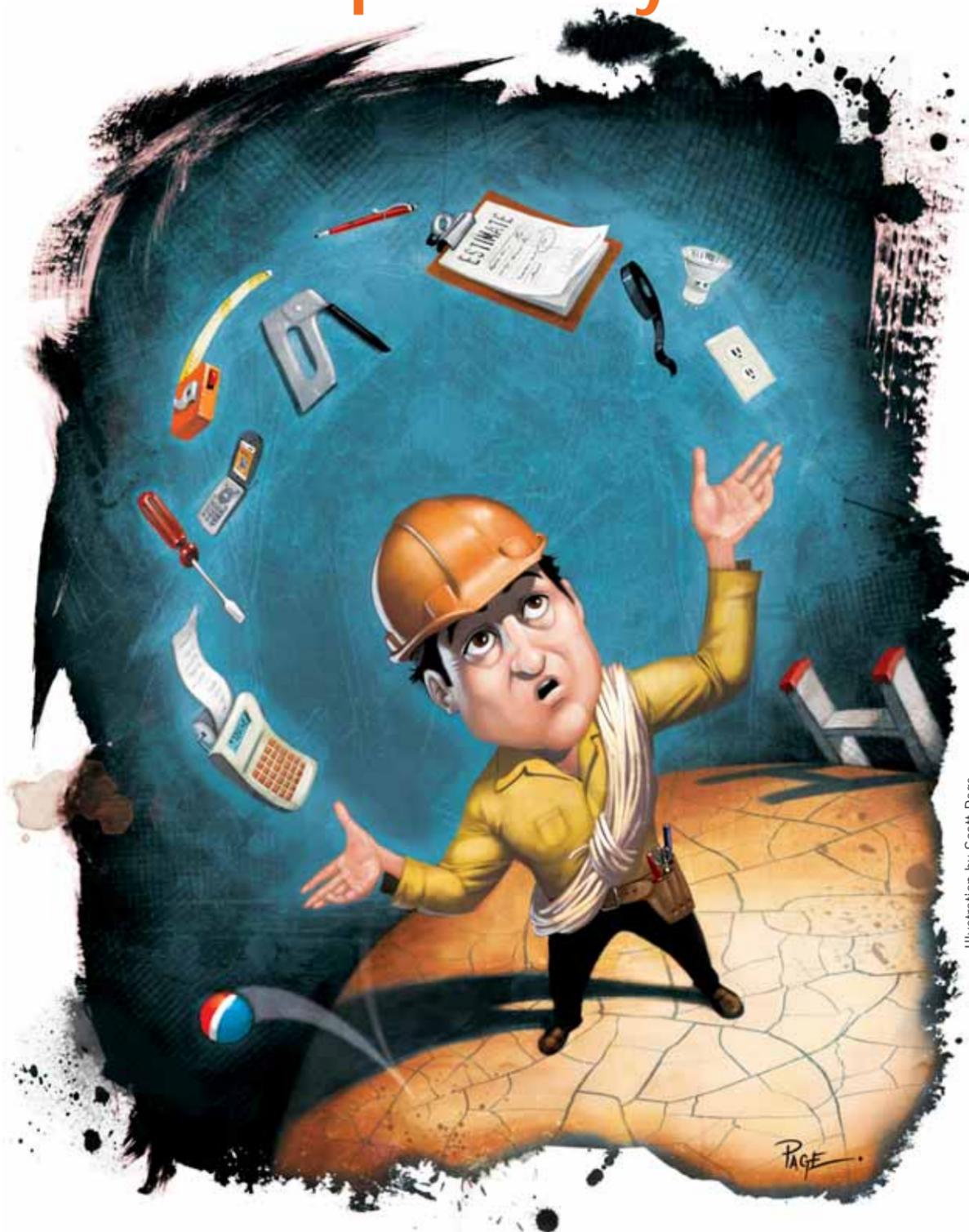


Illustration by Scott Page

Most people make the mistake of thinking they can *manage* their way to higher earnings and more time off. The theory is this: when we work harder we build up *sweat equity*, at which point we'll have lots of money and have more time off. This theory, like the one about our planet being flat, is flawed.

The truth is we end up immersing ourselves in the details of the business and we find it almost impossible to back out. We become such an integral part of the business that it cannot survive without our daily presence. We price the jobs. We install the work. We chase the cash flow, etc. Thus, the business owns us!

Because we use our technical skill to manage our businesses, we get drawn into the daily operations. That's where we have the most knowledge and are most comfortable. While this may be the route to more money, it most certainly is not the route to more time off or successful business growth. You end up trading freedom for financial reward.

You reach what I call "The Complacency Plateau"; the point at which you can just about handle all of your tasks in a reasonable fashion (only ever dropping the ball now and then). The business gets to a positive cash flow, but you're working flat out. You can't stop, otherwise the cash flow might dry up. You can't grow because you cannot handle any more work.

In essence, you've bought yourself a job, not a business, and it's almost impossible to turn it into one because, from day one, you've been on the wrong foot. You started off doing "the work of the business".

Make money, not excuses!

Think of your firm as a publicly traded company. Let's assume you're an average-sized trade contracting firm making profits that put you in the top 25%. This means you're doing \$3.5 million in sales and making 12% pretax profit plus your salary. The profit is \$420,000 and, at a 4X earnings multiple, the company would be worth about \$1.68 million.

When you and your spouse own the shares, you could sell them and get the first \$1.5 million tax-free and pay less than \$50,000 tax on the remainder. Not bad, eh?

Let's say you hire a manager. You forgo your salary of \$100,000, giving it to the manager instead. You would still get your \$420,000 profit (less any incentives you might have to pay the manager over your salary). If you paid the manager \$50,000 out of your \$420,000, you would still have an income of \$370,000... without working! If you kept the business for an extra 10 years, this arrangement would bring you \$3.7 million, and you could still sell the business for \$1.68 million. **EB**

I gave a client of mine a blank organizational chart showing different major areas of work that needed to be done in a typical small contracting business, then asked him to put his name next to each of the areas in which he did some or all of the work. There were eight boxes in total (one for General Manager, two for Sales, three for Operations, and so forth), and my client put his name next to six of them.

Most of us realize that, when we can't do the skilled trade work ourselves, we hire skilled tradespeople. Seems logical, so why can't we do the same for estimators? For project managers? General managers?

To be really successful you should not have to trade your freedom for wealth. Imagine lying on a warm sandy beach with a cool drink in your hand, and checking your e-mails only once every couple of hours "just to keep your finger on the pulse". Imagine spending more leisure time with family and friends. Imagine having the time for your grandchildren that you didn't have for your children.

I recently tracked the performance of 10 residential HVAC contractors who all made good profits over the past six years. They had trade backgrounds and built their businesses on their technical expertise. They knew how to price a job and how to make sure it was installed properly (this applied to service and retrofit). They had each amassed several million dollars in earnings over their years in business in the hopes of enjoying a financially comfortable retirement once they made the decision to let it go.

Without exception, they all failed in one area: they had created jobs for themselves, not businesses. They are all such integral parts of their businesses that they're finding it very difficult to take time off. Now that they're older (in their 50s and 60s), they want more free time but, because they never learned the art of leadership and delegating the management of their businesses, they have to make the key decisions themselves. When they eventually sell their businesses, they'll get a lot less than they would have otherwise.

Contrast their situation with that of one of my HVAC contractor clients here in British Columbia. Four years ago, he bought himself a fancy RV and told me he wanted to take six weeks of vacation. We went out and head-hunted a business manager for him and, after developing processes and systems to replace himself, he's worked himself out of a job—not his business, but his job. This year he will take six months of vacation (that's not a misprint: I said *months*, not weeks). I did a valuation of his business and we agreed it was worth four times annual earnings. He has just sold his business for six times annual earnings.

Here's the approach we took and you can follow a similar process (though you'll need to tailor the speed at which you make these changes to suit your cash flow and timelines). In an ideal world, you'd invest \$100,000+ in new management and systems. The first part of the process is tracking what you do with your time. Identify the simpler tasks; develop processes for them, then delegate them.

You may have to hire some extra hands or simply subcontract the work. For example, you shouldn't have to do any accounting or bookkeeping, nor collections or payments. These are tasks that others can do far more effectively than you. After all, if you're going to do any work, then do the work for which you were trained (I see more screwed up bookkeeping than you can possibly imagine). Doing this stuff yourself doesn't save you money—it costs you money.

Afterward, look at simple, repetitive tasks such as collecting drawings, following up with clients on basic items, or other tedious but essential tasks, and delegate those as well.

As a business owner, your job is to work yourself out of a job. Become a teacher and teach others to do what you do. Hire people to do the work of the business; work yourself out of a job. Do all this one step at a time. It may take several years, but you will eventually develop a business while losing your job, and gain months of vacation time to boot. **EB**

Ron Coleman, B. Comm., FCCA CMC, is a member of the Institute of Certified Management Consultants of British Columbia. A noted speaker, he has completed many interfirm financial comparisons of groups of construction companies in Canada and the United States. Ron's numerous published education programs include a 36-hour business management course specifically designed for ECABC. He is also author of the book, "Your Million Dollar System: How to Increase the Value of Your Construction Business by One Million Dollars in Three Years". Visit www.ronaldcoleman.ca.



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The old saw is new again

They've been called the best hand tools for tearing things down... and building them up. Long the tried-and-true ally of electricians, reciprocating saws perform their cutting action through the push/pull motion of the blade (hence the name).

The key things to keep in mind when shop talk turns to recip saws and, specifically, saw blades: blade construction (carbon steel cuts soft materials, bi-metal combines the long life of high-speed steel teeth with the durability of carbon backing); the number of teeth per inch (more teeth mean smaller teeth for slower cutting, generally used for making the extra-fine cuts); and length, because recip saw blades usually require a greater reach.

The reciprocating saw has many construction applications and, because it's specially designed to get into hard-to-reach places and power through some of the toughest materials around, this rough and ready tool has proven its value again and again to those who want to make the cut. Here are some of the latest innovations on this trusty saw.

■ **DeWALT** has recently introduced its heavy-duty 28V recip saw model **DC315K with Nano technology** (proprietary technology from DeWALT). A high-performance tool offering extended life and lighter weight (at 8 lb, the DC315K is lighter than many other 28V, 24V and 18V saws), this new 28V cutting dynamo features a special battery charged by nano-phosphate lithium ion cells that provide you with increased battery durability and cycle life, offering 2000 recharges (on average). The heart of the DC315K is a high-power, high-efficiency motor with an electric brake, affording rapid delivery of 0-3000 strokes/minute, with a stroke length of 1-1/8-in. to help you complete tasks quickly.

This new saw comes packed with a patented four-position keyless blade clamp that enables you to insert the saw blade into two common vertical positions as well as two horizontal cutting positions for increased versatility and convenience when flush cutting. With the blade in a horizontal position, users are able to cut close to floors, walls and ceilings, or where clearance is limited, resulting in less blade bending and breaking. The saw also has a three-position adjustable shoe that allows you to adjust the depth of cut for increased control and extended blade life.

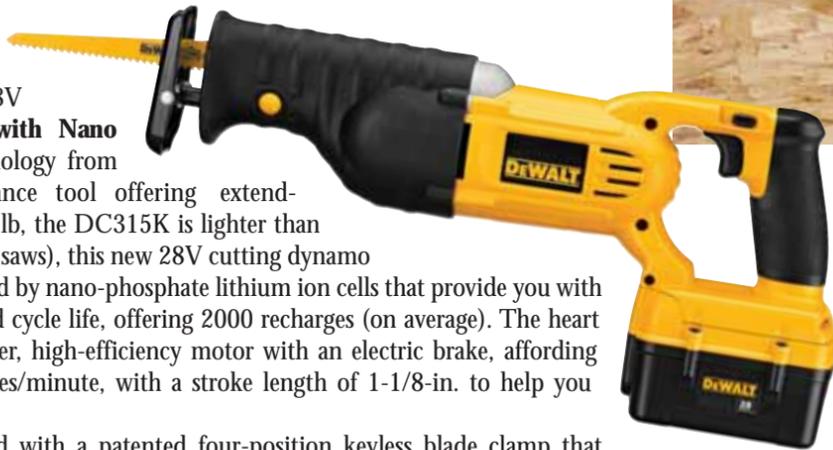
■ The new **twist-handle orbital reciprocating saw** (Model R3020) recently introduced by **Ridgid** features a tool-free twist handle that rotates at the push of a button for accurate cuts, as well as 90° stops for added convenience. The new saw also has a number of productivity-enhancing features, including a powerful 12-amp motor and a die-cast gear housing for added durability and tool longevity, tool-free blade changing, and dial orbit selection to allow you to quickly change from linear to orbital cutting.

The variable-speed trigger switch (0-2800 strokes/minute) provides greater cutting control, and the over-mould soft grip on the handle and front boot help minimize vibration and user fatigue. The R3020 comes with a Ridgid cord package comprising a 12-ft all-rubber power cord that allows for extra reach without an extension cord. It also has a lighted plug, which confirms when the tool is 'live' (using a backlit icon of the tool itself for quick identification). The orbital recip saw also includes a hook-and-loop cord wrap for easy storage, three heavy-duty blades and a heavy-duty bag.

■ **Bosch Power Tools and Accessories** has cut its teeth with the new **Litheon 36V 1651** cordless, two-speed recip saw that sports such ergonomic features as the patented LockJaw tool-free blade change system, a wide two-position handle and smaller rubber boot collar (which affords optimal control for varying applications). An integrated rafter hook also keeps the tool nearby, especially when working up in rafters or between joists. Additional features include an open toe shoe for enhanced visibility, and the capability to insert blades in reverse for accurate plunge cuts.

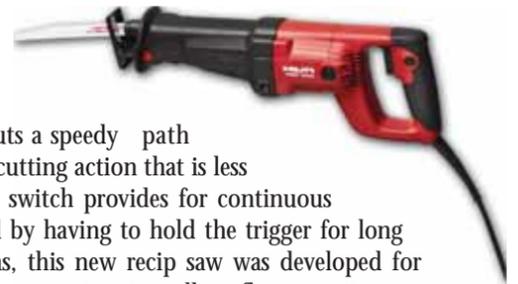
This brawny cutting machine can cut up to 1.5-in./sec in 1.5-in. particle board at top speed (0-3000 and 0-2400 strokes/minute). It's powered by the Bosch Litheon 36V battery platform, which offers two different 36V battery packs from which you can choose based on the application: the 36V FatPack offers a long runtime (up to two times more than 18V packs for most heavy-duty applications) while the 36V SlimPack is 1-lb lighter for better portability (offering up to 15% more runtime than 18V packs).

The Litheon 1651 is available individually or as part of the Bosch Litheon 36V four-piece combo kit, which also includes a hammer drill/driver, circular saw, flashlight, two 36V batteries, one-hour fast-charger and tool bag.



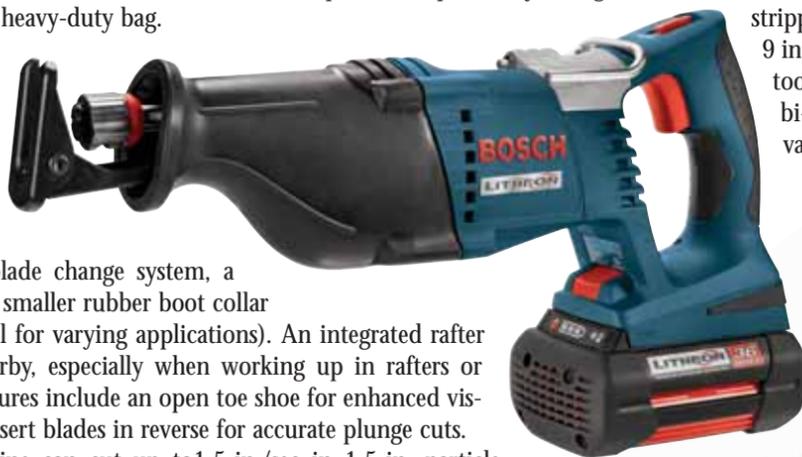
■ **Milwaukee Electric Tool Corp.** has unveiled the latest member of its Sawzall family with the new **15-amp Super Sawzall** recip saw (Model 6538-21). Key features include a 15-amp motor with Constant Power Technology that maintains constant speed and power under cutting load (in addition to providing enhanced overload protection), a patented gear-protecting clutch to extend gear and motor life by absorbing sudden blade lock-up, and a patented counter balance mechanism that produces low vibration levels to allow you to work longer without becoming fatigued.

■ **Hilti** extends its tool line with the addition of the **WSR 1000 recip saw**. Driven by a 1000-watt motor and a 1-1/8-in. stroke length, the WSR 1000 cuts a speedy path through tough materials with an efficient cutting action that is less wearing on the machine. A constant run switch provides for continuous cutting to help reduce user fatigue caused by having to hold the trigger for long periods. Able to fit in hard-to-reach areas, this new recip saw was developed for applications in tight spaces, such as creating openings in walls or floors; cutting pipe, strut, threaded rod and bracing; making openings for electrical boxes; and cutting framework or formwork. One of the tool's convenience attributes is the 'Kwik Click' chuck for fast blade changes without the use of additional tools. The WSR 1000 is also equipped with rubber cladding to give you a solid grip of the tool.



■ **Klein Tools** expanded its **Great White cutting line** to include an array of premium and standard **recip saw blades**. The premium blades have a leading-edge tooth geometry designed to provide a fast cut with less vibration. To meet a variety of cutting applications, the blades are 1-in. wide and available in lengths of 6 in., 9 in. and 12 in. The premium blade has a 1/2-in. universal shank to fit popular reciprocating saws.

Featuring a variety of lengths and thicknesses, the standard recip saw blades can be used for a variety of cutting applications. Armed with shock-resistant teeth that resist strippage, these new blades are 3/4-in. and 7/8-in. wide with lengths of 6 in., 8 in., 9 in. and 12 in. Like the premium blades, standard blades fit all popular recip saw tools with a 1/2-in. universal shank design. All Great White recip blades have a bi-metal design for fast cutting and extended blade life, and can cut through a variety of wood, wood with nails, and thin/thick-gauge metal. 



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Understanding programmable logic controllers

By David Herres

Programmable logic controllers (PLCs) exist in great numbers in industrial settings throughout the world. In all but the smallest, simplest configurations, they greatly surpass mechanical relay-based equipment—they are less expensive to install and operate, and more able to withstand variations in noise, vibration and humidity levels. Workers love their user-friendly diagnostics and ease of operation.

These electrical devices are really highly specialized computers with central processing unit (CPU), memory and software. They are designed to control machines and industrial processes automatically and can generate reports that are used to ascertain production efficiency and incipient mechanical problems. Unlike common PCs, they do not employ hard drives; instead, they have internal rechargeable batteries that keep the contents of the microprocessor-based memory intact.

In today's industrial setting we mostly see the modular rack-based system. The rack accepts various input and output (I/O) modules that slide in and plug into place. There are separate slots for analogue and digital modules, depending upon the needs of *in situ* (in-place) sensors and actuators.

The power supply also plugs into the rack, and may be AC or DC. Electrical power must be highly filtered and regulated to provide the needed stability for the solid-state circuitry in the processing unit.

PLCs were developed in the 1960s in response to problems plaguing the automotive industry. Because car makers perceived (rightly or wrongly) that the public wanted totally new designs every 12 months, Detroit engineers periodically tore apart their machinery—including control apparatus—to retool for a new production cycle. Relay-based production control lacked flexibility and so the annual changeover was seen as necessary.

In 1968, General Motors took delivery of the world's first PLC and, at that point, the idea of virtual switches and relays emerged. These devices are no longer hardware elements, but instead exist as software instructions that reside within the microcircuitry of the central processing unit. Today, it is possible to program machine controllers by plugging in, let's say, a laptop computer and manipulating simple ladder schematics on screen so that the machinery will perform in diverse ways as the need arises. There is unlimited flexibility and no waste.

The nitty-gritty of the PLC

A PLC consists of solid-state circuitry within an incredibly rugged housing. It has a varying number of I/O modules and a CPU with a serial or other interface capable of communicating with a conventional personal computer or dedicated terminal.

Included with the PLC is disc-based software enabling the technician to place virtual components within an onscreen ladder diagram and, so, quickly program the PLC. Programming in most instances is based on ladder circuitry. The left rail is the positive pole and the right rail is the ground bus (see diagram page 20). The program starts at the top. Each rung consists of an input and an output; in other words, one complete executed command. The input is on the left and the output is on the right. These elements each have a numerical address, such as 0500 or 1000. A simple example would be a single rung with a switch on the left and a light bulb on the right.

Equipment from various vendors incorporates somewhat different programming conventions. Most systems require an End command. When a PLC is operating, it is continuously scanning. The inputs are looked at first to see which ones are On. Second, the PLC actually executes the program, starting at the top of the ladder and going down. Lastly, the PLC updates the output status, and is then ready for another scan. Depending on make and model, these scans take place in milliseconds.

A technician can place the PLC in either of two operating modes. In Programming mode it receives instructions from a connected laptop. Then the controller is switched over to Run mode where it is ready to control production.



Photo © General Motors and Wieck Media Services Inc.

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Allen Bradley's PanelView is an operator interface that accesses PLC parameters, including diagnostics.



Inside the enclosure, input and output (I/O) modules are inserted into appropriate slots. The power supply and CPU also reside here.

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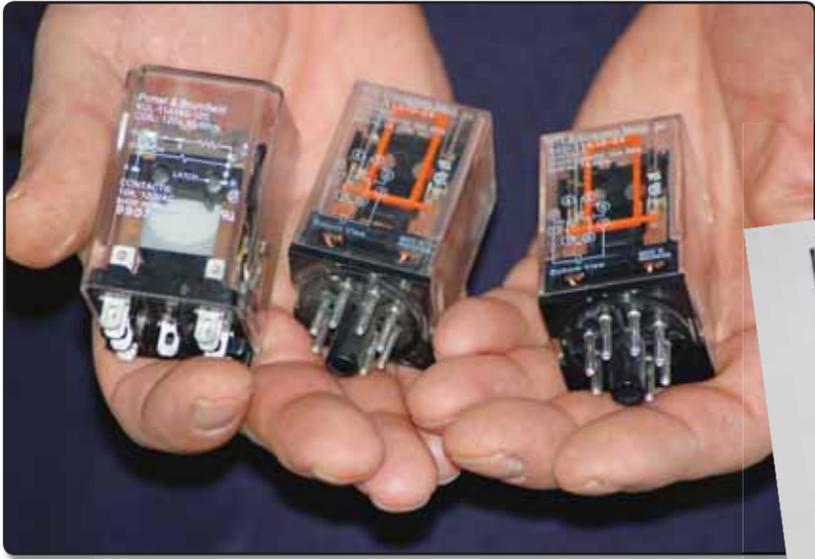


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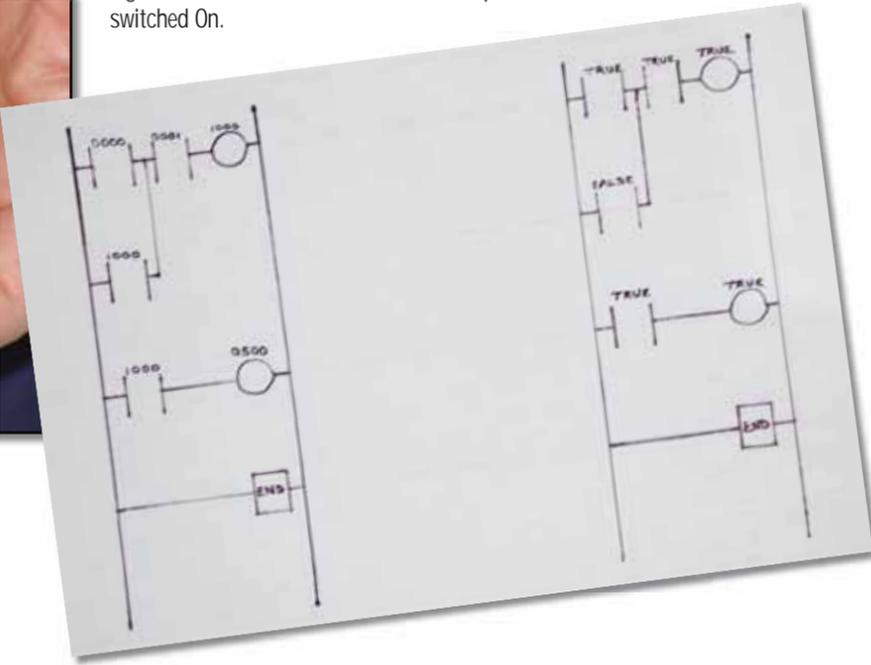
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The diagram below shows ladder programming placed in the CPU by means of a connected laptop. On the left are elements with assigned addresses as programmed. On the right are scanned logic states. In this case there are two outputs, and both are switched On.



Numerous old-world relays like these have been replaced by a single PLC, but they are still needed to connect outputs to higher voltage and current loads.

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PLCs range from small units with a limited number of inputs and outputs (these 'bricks' cost as little as a couple of hundred dollars and fit in the palm of your hand) to elaborate models of immense functionality that require many floor-to-ceiling enclosures.

Depending on performance requirements, a varying number of input modules are inserted into the correct slots so that they are wired to the sensors, which may be some distance away depending on the size of the machine. Inputs may be voltage sensors, pressure transducers, limit switches, flow meters and thermocouples for temperature readings. They can be analogue or digital.

Similarly, output modules are placed in their slots, which are wired into low-current control circuits to motors and whatever actuators are needed to make the machinery run. They also may be digital or analogue. An internal oscillator-based clock causes the PLC to scan the inputs at a high speed to read them. Then, based on the programming currently in place, the outputs are turned on in the right sequence with the correct time delays. Outputs can be latching or momentary, and the PLC is capable of highly nuanced commands.

Getting into PLC work

Professionals wishing to enter this lucrative field need not be computer engineers, but rather accomplished electricians with good computer skills. The programming was originally conceived to be fairly intuitive for anyone who can read schematics so that it can be done in a factory setting with in-house personnel.

The initial phase is designing the project and specifying the correct equipment. For some applications, scan time is critical. It's desirable to start with excess I/O capacity since the machinery is likely to demand more functionality as time passes. Also, having spare slots in case of malfunction is a plus.

The best way to get started is to decide on a vendor and become familiar with that milieu. Manufacturers have extensive technical information online regarding basic theory, mechanical setup, programming procedures and operation. A lot of the technical information is free, but there are also moderately and high-priced courses. Meantime, some manufacturers—such as Allen Bradley—offer certification. Siemens has a broad range of courses ranging from free online material to machine-specific, onsite staffed presentations.

There are also some websites that offer free introductory tutorials and more expensive video-based courses with certification. Two good introductory sites are www.plcs.net and www.plcdev.com. 

David Herres is a licensed Master Electrician in New Hampshire where he does electrical work and writes articles on the subject. He has a website dedicated to spreading electrical knowledge and expertise: www.electriciansparadise.com.



By Oliver Post

Making good on your service promise



Every electrical distributor strives to offer good service but, in a competitive market, it isn't enough to be good... you must also be different.

Competitive differentiation is where many distributors get it wrong; too often they try to follow suit of what they believe to be their most successful opposition, and risk losing those qualities that set them apart in the eyes of their customers.

Too often the focus is on short-lived promotions, and not on the value that a distribution business brings to its customers every day.

This is, frankly, not that different from any business. How many smaller retailers tried to emulate the Wal-Mart model when it first arrived in Canada? Quite a few, actually, and to their own detriment. What those businesses failed to recognize was the unique value they already brought to their customers.

It was, in the language of the business consultant, all about the customer experience. Now, I frankly dislike turning the individual efforts of people who work in a business into a set of catchphrases, but they do provide some easy-to-remember focal points.

In the case of the customer experience, each person in your organization should be asked what your distribution organization stands for and, in turn, what they contribute in support of that position.

For example, if yours is an organization that focuses on offering premium-quality, branded products, but you have a purchaser who spends an inordinate amount of time hunting down the cheapest products on the market, there is an obvious disconnect.

Or, if you believe in fast service above all else but don't staff the counter with enough personnel to really deliver on it, then perhaps your business' strong points are different from what you thought.

Again, the goal is not just to be good, but to be good and different.

The fact is that great service will keep customers coming back more than pricing, and that a series of bad service experiences at a deep discounting distributor will wear down even the most price-oriented customer.

I recently came across some research that said 80% of customers stopped doing business with a company because of a bad service experience, and that they will never do business with such a company again.

There are a lot of ways you can drive a customer away, but to keep the tone positive here, I'll focus on the flip-side: how to ensure a great customer service and differentiating yourself.

Be fast

Fast service has to be number one. As much as you might pride yourself on your company's ability to get orders to the customer quickly, have you ever measured it? And can you improve? Do both, and see if you can't find something to set yourself apart from the competition.

One electrical distributor must have done exactly that and determined that it could promote what it was already doing (or close to doing, anyway) with service guarantees. It promises that a counterperson will be at the counter within 30 seconds of a customer pressing a service button or they'll give him a \$5 coupon. And for called-in orders, if needed, and if in stock, the distributor promises they'll be ready in 20 minutes or they credit the account \$20.

That is something they can and do promote. And it sets them apart from the competition in ways that have nothing to do with price.

Everybody seeks to provide quick service, but not everybody achieves it consistently. A consistent process can help you do this.

Be smart

Having competent staff would seem an obvious path to good customer service, but in a labour market where it can be tough to keep experienced knowledgeable staff, you likely find yourself with less experience at the counter and on the phones than you might like.

So you need a good training regimen. Yes, the supplier clinics and online resources are valuable but, when you hire staff, do you pair them with experienced members of your team? When you do, they can learn properly on the job—not just by trial and error. Not everyone is cut out to be a mentor, but you could probably make a list right now of those who would enjoy the experience.

Further to the knowledge front, you also need to have proper information systems in place to access information on products, inventory, building codes, etc. The right resources can allow even the greenest team member to competently serve a customer.

Be personable

Customers want to know that the people with whom they are dealing care about their businesses.

This trust is often the result of years of dealing with the same person. Having direct lines to individual counter staff is one way, but there has to be a fallback position. After all, it's not always possible to have one individual dedicated to a given customer every time. Having the right systems in place can provide a level of confidence for the customer; that whoever is serving them knows at least something about their business. A note on the customer file about a job they are doing (i.e. "big renovation on Century home") and a friendly manner can keep dealings personable with all customers.

Focus on money matters

While customer-facing staff spend most of their time dealing with the business needs of the customer—and probably doing a pretty darn good job of it—much of that goodwill can be lost when an invoice is wrong or unclear.

More acrimony is the result of invoicing issues than any other single point. Consider our service guarantee example: how would a customer feel if his \$20 credit wasn't applied? The same goes for rebates, discounts, returns and promotional pricing.

Everybody involved in entering orders needs to understand how important it is to get it right; service doesn't stop once the sale is completed.

Be consistent

It may seem like a contradiction, but the path to differentiated service is through consistency of process. Deviation is the enemy of excellence. When every staff member in your business has "his own way of doing things", you'll never achieve excellent service in a consistent fashion.

It is only by tightly defining how customers are handled, how orders are pulled and how follow-up is conducted that you can make promises to customers you can keep. And that's the best way to set yourself apart from the competition. 

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For packaging end-users, such as plant operators, this means a push to get more product throughput out of smaller, lower-cost machines without sacrificing one iota of product quality.

OEMs are driven by parallel requirements to offer highly flexible solutions at lower costs. They must deliver system/machine scalability, meet changing market demands and support simplified integration with the rest of the line. Their primary goal is to offer solutions where end-users pay only for what is needed. From a controls perspective, integrating motion and logic in a scalable hardware package can help fulfil this need.

Centralized architecture: not bad, but not great

The advent of a centralized architecture for motion control and logic has provided some advantages. The integration of motion control into rack-based PLCs helped reduce the component count in the control panel enclosure, and made

it possible to program motion and logic from a single point in a single program. This delivered an initial round of cost savings. Ultimately, however, this was only true when a single processor was used with a medium axes count.

A centralized control has an inherent limitation: there is a fixed amount of microprocessor resources available for all required functions—motion, logic, overhead tasks and communications. In any operation, top priority is always given to the motion task. Whenever an axis is added, a new burden is placed on the centralized processor.

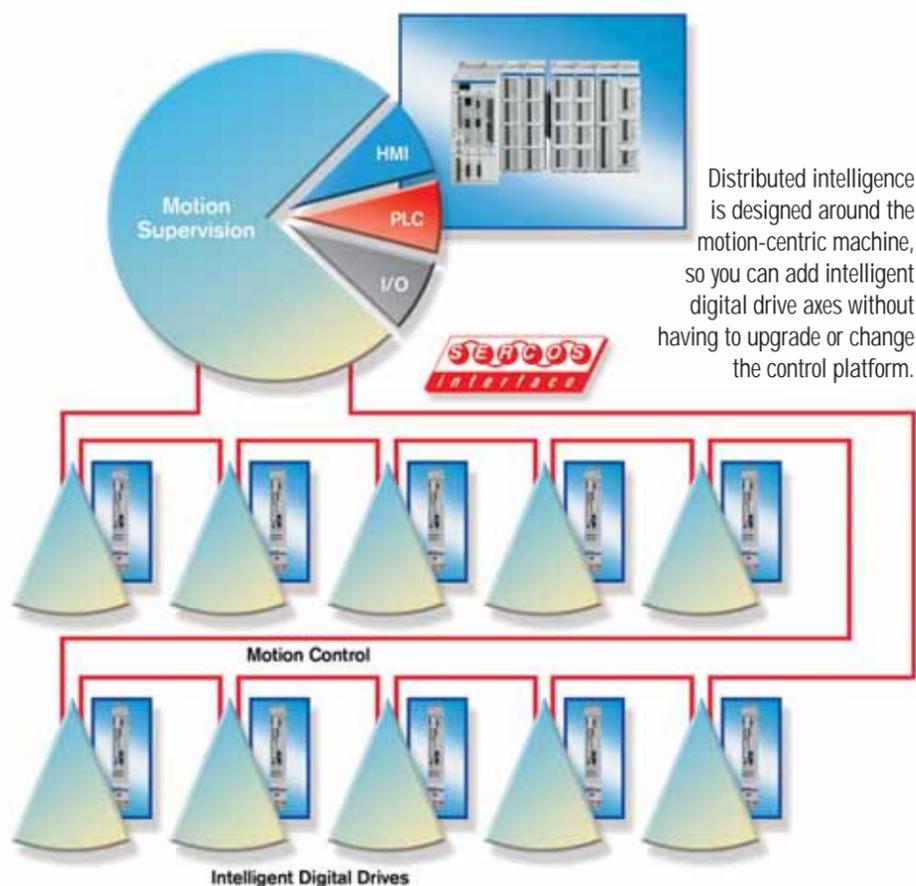
At a certain point, the processor hits its limit and starts reducing performance to accommodate the additional axes. This reduction might be in the form of a slower response to registration inputs, not being able to run complicated cams, programmable limit switches, or not being able to run the system as fast as the machine is capable of running. This, in turn, can result in the need to add more processors so the machine can run at full capacity. Once this becomes necessary, there is little or no cost or operational advantage when a design engineer is forced to install complex PLCs for simple, low-axes count applications.

The disadvantage to PLC-based motion controllers is the

centralized control architecture. In a number of situations, it has proved to be the limiting factor in providing low-cost, scalable, high-performance solutions. On simple machines like fillers, augers, infeeds, wrappers and cartoners, using a PLC for the motion control can be overkill. It can add prohibitive costs that make it difficult to create a machine that fully meets an end-user's cost-performance requirements.

In addition, centralized control can limit an OEM's ability to optimize machine performance. Packaging machines are very motion-centric, which makes motion control critical for maximizing efficiency and throughput. For example, a vertical form fill and seal machine that can mechanically run at 200 pieces-per-minute (PPM) might only be able to do 145 PPM due to limited controls performance. In some cases, using a centralized control architecture can double the price of the control system.

Centralized control has reached the limit in the value it can offer. With today's fast-changing markets calling for much more production flexibility and scalability, the limitations of PLC-based centralized motion control are more evident. New technology and new approaches to motion control and logic have created a powerful alternative: distributed intelligence.



Distributed intelligence is designed around the motion-centric machine, so you can add intelligent digital drive axes without having to upgrade or change the control platform.

places a heavy burden on the processor. For true distributed intelligence, a drive should be able to handle such tasks as closing the position loop, absolute positioning, high-speed registration, cam tables and diagnostics.

As more tasks are handled by the drive, the load on the controller is reduced. A perfect example is the provision of safety and predictive maintenance tasks at the drive level. These tasks do not necessarily have to be managed from a central location. Plus, by making them drive specific, problems can be quickly isolated, downtime can be reduced and machine throughput optimized.

The motion controller is the next component in this architecture. A DI-ready controller must take full advantage of intelligent drives. Its key tasks include running logic, overseeing drive communications, I/O peripherals, HMIs (human-machine interfaces) and system networks. Involvement in the motion is at a supervisory level.

Integrated logic and motion control in a drive

Integration of the logic and motion control in a drive implements the distributed intelligence model without sacrificing machine performance and ultimate value. This is ideal for packaging systems such as carton erecting, flow wrappers, smart belts, infeeds, cartoners and labellers.

Integrating motion and logic in a drive is the way to achieve the flexibility and scalability today's fast-changing production environments require. As OEMs strive to create high-performance low-cost machines, and end-users in the packaging industry push to keep a lid on capital expenditures, the distributed intelligence solution provides an innovative path forward. It leverages the advantages offered by today's advanced microelectronics and supports a complete, high-performance system at the lower cost end-users require. ^{EB}

This article contributed by Bosch Rexroth Canada.

Distributed intelligence: much better

Distributed versus centralized control is defined by the location of processing power for the motion control. With a centralized architecture, a fixed amount of PLC processing power is divided among all the axes. As axes are added, the available processing power is reduced.

Distributed intelligence (DI) solves the problem in a simpler way. It moves the burden of controlling an individual axis out to the drive. Thanks to advances in microelectronics, intelligence can be distributed throughout a machine to the sensors, motors, drives and other components.

In a DI system, each drive is capable of closing the feedback loop and can handle such advanced functions as cam tables, absolute feedback, electronic line shafting (ELS), diagnostics and high-speed registration. It is even possible to add safety and predictive maintenance functionality at the drive.

The processing power that can be built into the drive with today's low-cost processors and memory allows the drive to be quite intelligent. Most importantly, when you add a drive, you add more intelligence to the system. This is the exact opposite of centralized control, where every additional axis drains processing performance. Distributed intelligence not only reduces the processing load on the controller, it changes the controller's role in motion control to a supervisory one.

Enhanced scalability

Distributed intelligence is a modular, responsive architecture, supporting the scalability that is an absolute requisite in current operating environments. Adding an axis is greatly simplified: just add a new servo axis. There is no need for additional expansion cards or functionality for the controller. The intelligence is in the drive itself.

Adding functionality and intelligence in a drive-by-drive, distributed fashion frees design engineers to create machines that serve end-user demands for more convenience and flexibility. And because processing power has ceased to be a limitation, more servo-controlled axes are practical. Other advantages include faster setup, greater precision and higher reliability.

DI architecture can also enhance operational uptime and flexibility by supporting integrated safety and predictive maintenance at the drive level. It is made easier because of the quicker response and data monitoring inherent in a distributed intelligence platform.

Implementing DI

Implementing a DI system requires several components engineered to work in a decentralized architecture. These include intelligent drives and a DI-ready controller. Some may think an intelligent drive is one that can simply handle the position loop and receive inputs. However, this type of drive still



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By Bob Patnaude

Considerations for effective emergency alarm systems in the workplace



An emergency evacuation of their workplace is not something most employees consider as they go about their usual day. Yet, when events arise requiring evacuation or some other emergency action, employees must be able to recognize the emergency situation and follow the established procedures that result in the quick and orderly response that assures the safest possible outcome. Since such emergencies are relatively rare and not top-of-mind for most people, an effective employee emergency alarm system is critical because it is relied upon as the primary means of notifying employees of an emergency and directing their course of action.

Three keys to an effective alarm system are:

- Coverage
- Consistency
- Automation

Coverage assures that emergency notification can reach all occupants in and around an entire facility. *Consistency* assures

that the occupants recognize and understand *in a unified way* the meaning of a given emergency signal, and *automation* supplies the systematic means by which emergency communication is implemented. With these three concepts and industry standards in mind, this article presents some considerations for designing an effective employee alarm system.

Evaluate your workplace

Gaining a clear understanding of the scope of the workplace is the first consideration in the design of an effective alarm system. All plants and facilities are different in terms of both their physical layout and the comings and goings of their occupants. Facilities might have multiple buildings/levels, outdoor break areas, parking lots, conference rooms, recreation areas, rest rooms and, sometimes, isolated workspaces. Employees move around and there are often temporary employees or visitors in the facility who have not

been trained in its emergency procedures. The design of the alarm system, then, must take into account this plethora of workplace variables to assure all occupants are properly notified and directed during an emergency.

Ensuring that all employees are notified and properly directed in times of emergency can be a challenge, as people move from place to place within a building, or from indoors to outdoors. Complete coverage can be achieved by integrating all warning devices, including outdoor signalling, into a single system. Warnings should also reach even the most isolated areas in a facility, including areas that go unused most of the time, such as basements and substations.

Presenting a unified, understandable message

In terms of consistency, communication methods used for emergencies (such as tones, lights, horns, bells or prerecorded voice messages) should be understood by all employees



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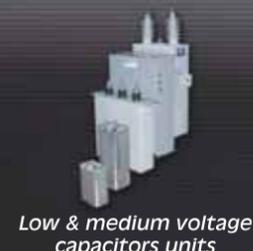
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as emergency signalling. Ideally, the emergency signalling used in an office area is the same as that used in the plant, on the loading dock or in the parking lot. Consistency simplifies emergency response training.

The ambient noise and light levels within a facility are very important to consider when designing an alarm system. Since noise and light levels can vary significantly throughout a facility, special care needs to be taken to assure that emergency signalling is always noticed and understood, but in a way that is appropriate to its immediate surroundings. Noise levels should be measured throughout the facility to assess the acoustical environment in which the alarm system will operate.

In terms of audible alarm signalling, devices of varying output can be used throughout a facility, and a specification of 10dB over ambient noise level is a good rule of thumb. Varying the audible output relative to the noise level in a given workspace assures the alarm will be heard while not posing problems, such as signalling that is overly loud in quiet office settings or inadequately low in vast outdoor spaces.

In environments where hearing protection is used due to high ambient noise levels, as is often the case in manufacturing and processing plants, alarm devices must overcome the hearing protection. Visual devices can be used either as emergency signals themselves or as a means to call attention to an audible signal.

Care should be taken to make sure such visual signals are dedicated to the employee alarm system, because if they are also used to signal non-emergency events, they may not be heeded in times of emergency.

Typically, an emergency action plan will take into account the fact that emergencies are not all alike, and specify different responses depending on the type of emergency. For instance, a tornado would call for a warning directing employees to an indoor safe area, whereas a gas leak would call for an evacuation to the outdoors. For this reason, the most effective emergency alarm systems employ multiple tones or messages to differentiate events for occupants.

When the number of potential emergencies is limited, tones are useful. However, more than a few tones can be confusing, and prerecorded digital voice messages may be used to signal specific emergency events and the required response. In environments where PA announcements are frequent and considered normal, the use of an 'emergency tone' in combination with a voice message is advisable to assure that the emergency message is clearly differentiated from routine broadcasts.

Reducing human involvement and error

How emergencies are reported and alarm systems activated should be thoroughly explored as an emergency alarm system is being designed. Although PA systems can be used as a method of communicating emergency warnings in an employee alarm system, special care must be taken when doing so. When using a facility's standard PA system for emergency warning, it can be difficult to assure emergency messages have priority over non-emergency messages because most PA systems can be accessed from many points at any time by many employees.

Problems can also arise when PA messages are routed to specific individuals, such as security guards or receptionists. In those cases, for instance, the alarm system could fail if those individuals are incapacitated in the emergency or do not receive important details. In short, emergency systems that rely heavily on people interfacing with a general PA system are faced with risks not inherent in dedicated emergency alarm systems.

The most reliable employee alarm system is one that is isolated from the general PA system with dedicated initiation devices and alarm signals throughout the facility. A dedicated system eliminates confusion and assures that a clear line is available during times of emergency. Furthermore, by fully automating a dedicated alarm system, health and safety managers can more easily facilitate very comprehensive emergency action plans. Regardless of the number of emergency situations covered in a plan, an automated system provides assurance that proper emergency notification and direction will always be clear and precise.

Capture attention and communicate clearly

The critical nature of employee alarm systems requires that great attention be given to their design and function. The ultimate goal of an employee emergency alarm system is to capture the attention of everyone, and communicate the desired response without creating confusion. The most effective systems are designed and installed with particular consideration given to the concepts of coverage, consistency and automation. **EB**

Bob Patnaude is the director of marketing for Federal Signal, and has worked in the signalling and communications industry for over 10. He has led Federal's industrial marketing team since 2004.

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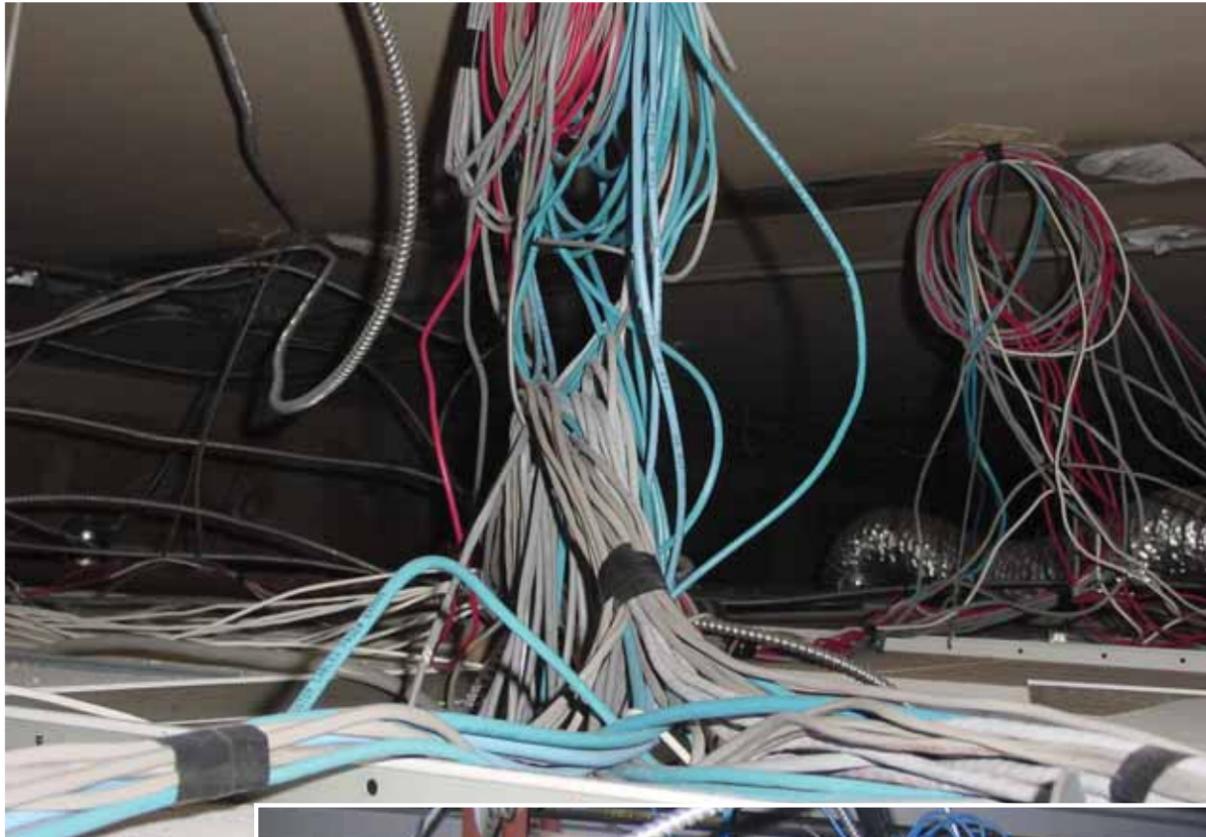
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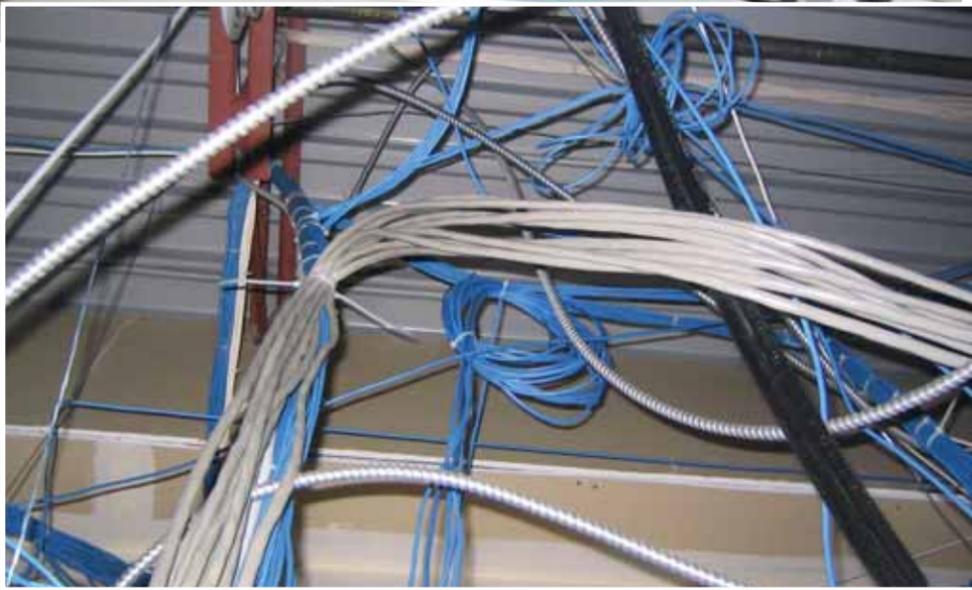


By Serge Oberoi, P.Eng.

Structured cabling for your lasting connection



Over 70% of network outages are caused by poor cabling. In addition, unprotected cables installed in building plenum spaces pose a serious risk to the health and safety of occupants in the event of a fire.



What is data worth to a company? Over 70% of network outages and hiccups are cabling related,¹ yet we fail to fully recognize the perils associated with a less-than-judicious approach to cabling selection and installation. Hidden out of sight behind walls and ceilings, data cabling often escapes the focus that it deserves. With ever-growing pressures to extract more and more bandwidth, structured cabling is left with diminishing safety margins and higher susceptibility to performance degradation.

Much has changed in the past few years. Businesses today cannot operate without the Internet, e-commerce and e-mail. Massive amounts of financial, commercial, audio, video and supply chain data criss-cross the globe every second. An interruption in the flow of this information can bring an enterprise to its knees. The success of a business, therefore, is very much tied to its ability to process and transmit information efficiently and without any latency.

The lower transmission frequencies of the 10BaseT and 100BaseT cabling of the 1980s and 1990s posed far fewer challenges than today's gigabit systems. There was always plenty of headroom to compensate for manufacturing and installation shortfalls. Talk to any installer and he'll tell you how easy it was to string Cat 3 or 5 cables. Many installers back then did not have to contend with alien crosstalk, return loss or ACR failures.

But during the past 10 years or so, the increasing demand for higher bandwidth has pushed the technologi-

cal envelope. Copper-based solutions are being propelled to work with higher and higher frequencies to maintain their competitive edge against fiber. We have moved from 100MHz to 500MHz in the space of few short years. Transmitting data at these high frequencies comes with new and daunting challenges, such as dealing with signal attenuation, alien crosstalk, impedance mismatch, EMI (electromagnetic interference) and a myriad of other hurdles. These challenges have been compounded by full-duplex communication protocols used by current transmission technologies.

The headroom of the past is no longer available to cable manufacturers and installers of today. Stretching, kinking, grazing or causing any other impairment to a cable is no longer forgivable. Cat 6 and Cat 6A (Augmented) cabling must be protected at all times to ensure uninterrupted conveyance of information over its lifetime. Many installers have been bewildered to find a cable has failed, even though they could find no physical evidence of impairment. High-speed cabling requires a new breed of highly skilled engineers and technicians that understand cable behaviour under ultra-high stresses. A little nudge or an imperfect termination can spell an instant failure.

Cable manufacturers have to develop processes and controls that can maintain uniformity and quality required for gigabit cables. Even a slight change in a process can result in variation of insulation thickness and concentricity, resulting in non-compliant product. A sudden drop in the

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outdoor temperature is enough to require process tweaking to maintain acceptable product quality. Meeting the required IEEE, TIA/EIA standards are so onerous that even a minor deviation can make a difference. An installer once asked me "not to breathe" near his Cat 6 cables. (He meant it is as a joke, but the truth is not far off.)

IT and data centre managers need to evaluate all options before picking a cabling solution that is reliable, cost effective and futureproof. Most cabling plants stay in operation for 15 years or longer. Care must be taken to ensure that cabling will fully support at least three generations of the network equipment it is expected to serve. Fortunately, the cable industry has kept pace, anticipating future needs for greater bandwidth.

Today's users have a variety of choices to exercise. Copper cabling systems are available now for speeds up to 10 Gigabit, and manufacturers are racing to produce the next generation of copper-based solutions. Unfortunately, while manufacturing has made steady progress, onsite installation practices have not kept pace with new products; the traditional approach to site installation, termination and testing of gigabit cables is simply out-of-step with the cabling technology.

Furthermore, buyers must think about the environmental issues now at the forefront of public debate; the toxicity of cable materials will force legislators to enact laws and penalties against cable abandonment. Future cabling systems will have to be scalable and modular. Cables will need to be encased in rigid piping or bendable protective armour—not only to preserve performance but also to minimize risk to occupants and the environment in the event of fire. Future cabling systems, above all, will need to be flexible, maintainable and offer rapid installation and de-installation.

Before you buy, make sure you take into consideration all these facets of cabling. And, when your operation lacks the expertise to deal with anything but legacy cabling systems, try to bring that expertise in-house, or consider partnering with a supplier who will help you make the right decisions. 

Notes

1. *Carrie Higbie, The Siemon Company.*

Serge Oberoi, P.Eng, consults for manufacturing and technology companies, and has over 30 years of national and international experience in the process design, product development, business transformation and project management fields. He has taught management resource planning at Algonquin College in Ottawa, and is skilled in JIT, LEAN and other productivity tools. He is currently a product and process development lead with Electec Ltd., an Ottawa, Ont.-based manufacturer of structured cabling solutions and power distribution systems, and can be reached at oberois@sympatico.ca.



Explosion-proof LED light

Federal's new hazardous location LED, Model 27XL, is an explosion-proof light that produces 60 high-intensity flashes per minute, or can be configured to a steady-burning state. This warning light operates on 24VDC, 120/240VAC 50/60 Hz. Its corrosion resistance is achieved with a powder epoxy finish applied over the copper-free aluminum housing, while all exposed hardware is high-grade stainless steel. With an effective candlepower of up to 134, it also features a standard low in-rush circuitry design that provides greater compatibility with factory automation control systems and less electrical interference with in-rush sensitive devices.

Federal Signal Corp.

www.federal-signal-indust.com

Fixture box



Arlington's new all-metal FS420SCL fixture box is a one-piece unit, no assembly required, that ships ready-to-install

on a 24-in. suspended ceiling grid. Installers who previously attached a metal box to a bracket in the field, then added a chain or wire for support, now have an assembly that's tested and rated to support exit lights, security cameras and other light fixtures up to 25 lb. The product is UL/CSA listed as a complete unit: box, bracket and drop wire. To position the box, loosen the appropriate screws, slide the box along the bracket and retighten the screws.

Arlington Industries Inc.

www.aifittings.com

Shallow recessed direct-indirect luminaires



Cooper Lighting has launched its Corelite Class R series of shallow recessed direct-indirect luminaires featuring T5 specific low-energy technology to aid in sustainable design. Available in two low-profile housings (Class R1 and Class R2), the line comes in 1 x 4-ft., 2 x 2-ft. and 2 x 4-ft sizes with one-, two- or three-lamp options. Offering seamless ceiling integration with four standard T interfaces, the series has four shielding options: Lensed, Micro Baffle, Round Perf and Rectangular Perf. The co-extruded lens in all shielding options comprises either clear or frosted acrylic, and incorporates two optically designed integral linear prism structures.

Cooper Lighting

www.cooperlighting.com

Electronic HID ballasts with dedicated circuitry

Advance has introduced its e-Vision electronic HID ballasts with dedicated circuitry for self-heating thermal protectors for 70W and 100W metal halide downlight applications in retail, commercial and industrial settings. Designed with a smart-sensing thermal protector power source, these ballasts feature an auto shut-off mechanism for lamps operating in a questionable thermal environment due to misapplication or failure of thermal protector heating ele-



ments. In addition, the ballasts' compact housing (4.7 x 3.6 x 1.5 in.) supports design flexibility while their reduced size and weight relative to magnetic F-Can configurations can offer cost reductions in components, shipping and storage. They also feature a 90°C maximum case temperature rating, automatic lamp power control, lamp monitoring and end-of-lamp-life (EOL) protection.

Advance

www.advancetransformer.com

Expanded bollard series



Kim expanded its Bounce Bollard Series with a bollard in 30W, 45W and 60W variations, as well as the Mini Bounce for use in courtyards, interior sections of shopping centres, pedestrian zones, and path lighting around offices and commercial buildings. Product

variations include Mini-Bounce pole-mount and wall-mount luminaires. Glare control is achieved through a flat lens horizontal lamp optical system with a cap that produces bounce light to illuminate pedestrians or surrounding vertical elements. These systems offer easy re-lamping by simply hinging open the hood (via stainless steel hinge and three stainless steel captive screws concealed from view).

Kim Lighting

www.kimlighting.com

Swing-arm, patient area compact fluorescents

Geo, a trio of swing-arm, compact fluorescent wall sconces made by Alkco, are designed primarily for patient bedside uses in medical environments. Constructed from solid brass for wall bracket and lamp arm, and available in a choice of conical, drum-shaped or dome solid acrylic shades, Geo offers soft, diffused illumination while providing the structural durability and easily cleanable outer and inner surfaces required of fixtures in healthcare environments. Geo's swing-arm mounts to a disc-shaped wall bracket via a fully articulated hinge for quick positioning. Illumination is provided by a single 18W quad tube fluorescent lamp with electronic ballast for quieter, flicker-free illumination (dimming ballast may also be specified).

Alkco Lighting

www.alkco.com



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LED hazard warning lamp series

LEDtronics has announced its new LED hazard warning lamp series: the BRA304 has a quick disconnect-type, single-contact bayonet base that mounts directly into an industry-standard hazard roadside flashing light socket. The LED lamp, which has a solid-state design that makes it almost impervious to shock, vibration, frequent switching and environmental extremes, is made of four 5-mm yellow LEDs positioned to work with the reflectivity of the prismatic lens in standard hazard roadside flashing lights. BRA304 will light for 197 days (4728 hours) on twin 6-volt DC batteries in flashing mode.

LEDtronics
www.ledtronics.com



LED replacement for incandescent exit lamps

Now you can retrofit existing emergency signs from incandescent lamps to energy-saving LEDs. With one kit for all applications, Standard ENS 2000 LED exit lamps offer optimal light output and long life (up to 100 000 hours). This flicker-free U-shape lamp is available in 1.2W/120V with an adjustable base.

Standard Products
www.standardpro.com

Cold-cathode 8-watt A-lamp

TCP has unveiled its new cold-cathode 8-watt A-lamps—Flat PAR30, Flat PAR38 and R30—for indoor and outdoor settings. Also available in 3W and 5W that can last an average 25,000 hours, these products are recommended for rapid-cycle applications, such as signage, amusement parks, rooflines and theatres. A phosphor coating provides enhanced colour consistency and



is resistant to fading and the effects of UV. Non-leaded glass provides good lumen maintenance over the life of the bulb. The 8W cold-cathode lamps are dimmable to 20% for accent lighting where lower light levels are desired (i.e. restaurants).

TCP Inc.
www.tcpi.com

High-output linear fluorescents and expanded cMH lamps

GE's T5 covRguard fluorescent lamps promise performance and versatility combined with good shatter protection (a 10-mil thick FEP shield offers shatter resistance to contain glass fragments and phosphors should a lamp break). All covRguard lamps meet appropriate regulatory guidelines and are certified for use in food service areas. Able to withstand temperatures up to 300°F, the exclusive covRguard shield is designed to meet the demands of high-temperature T5 high-output operation; it will not crack, peel nor become brittle over the life of the lamp. The fluorescents are ideally suited for indirect luminaires and uplighting, or as replacements for HID fixtures in warehouses or high-bay applications.



Meantime, GE's high-intensity discharge (HID) product line now offers a broader line of low-watt ceramic metal halide (cMH) lamps—the result of the introduction of five 39W cMHs. They include spot and flood versions of the ConstantColour cMH 39W PAR20, along with 39W PAR30 lamps in 10° and 15° spot, and 25° flood versions (with 4000K colour temperatures). The addition of these cooler colour temperature lamps provides retailers and other end-users with more PAR choices from the company's line of 80+ CRI (Colour Rendering Index) cMH lamps.

GE Consumer & Industrial
www.gelighting.com

Miniature line-voltage track heads

W.A.C. Lighting has launched a series of miniature line-voltage track heads. The new luminaires can be mounted and aimed in nearly any configuration to provide the right amount of light for the application at hand. The series offers track heads with amber and white glass shades, as well as black and white metal finishes, and includes the Flex Arm style and the Flyback and Gimbal Ring styles. These track heads employ GU10 lamps to achieve the sleek look of a MR16 track head without requiring a transformer.



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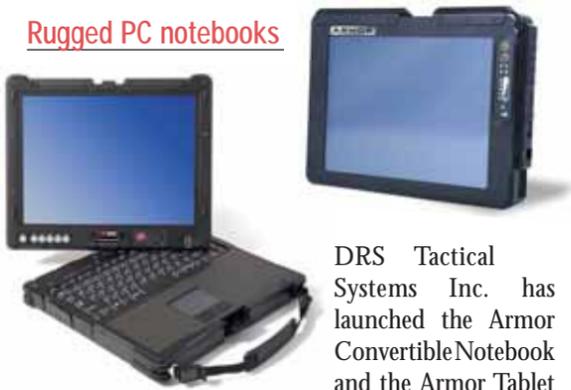
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Rugged PC notebooks



DRS Tactical Systems Inc. has launched the Armor Convertible Notebook and the Armor Tablet PC—new rugged computing products offering 'anywhere' connectivity and high performance, even in the most extreme environments. Weighing just over 5 lb with a die-cast magnesium alloy case, the notebook offers such communications options as integrated Wi-Fi, Ethernet and a PCMCIA slot. The 12.1-in. touchscreen display quickly transforms from a tablet-style computer to a compact notebook with a full-size keyboard. The Armor Tablet has an aluminum chassis and is available in both touchscreen and passive pen versions. Its 10.4-in. LCD monitor uses backlight technology for enhanced indoor and outdoor viewability.

DRS Technologies
www.drs.com

Thermal camera with GPS



FLIR has announced the addition of a new camera to its P-Series line of thermal imaging cameras. The PC-compatible Thermacam P660 includes a GPS (global positioning system) and a tagging feature using GPS Google Earth data that 'tags' infrared images captured to determine patterns in equipment failure. Equipped with a remote feature to monitor equipment in high-voltage and other dangerous areas at safe distances, the use of the P660 can be extended to new environments and applications by deploying the hand-held wireless LAN-based remote control and display. This new IR camera includes a high-definition 640 x 480 detector array, powerful thermal sensitivity (<45mK), and a 3.2 megapixel visible light camera and target illuminator for low-light areas.

FLIR Systems Ltd.
www.flir.ca

Programmable controller



Schneider has introduced the Twido Extreme, an easily programmable controller for automated control systems. Designed for industrial and commercial machines in applications such as remote pump water stations, refuse collection vehicles, cement mixers and agricultural vehicles, this robust unit (powered by 12VDC or 24VDC) can withstand temperatures as low as -40°C and as high as 110°C, and provides a capacity of 41 I/O digital/analogue or PWM. Its metal enclosure guards against severe environmental effects and mechanical wear and tear. It resists shock and vibration, and protects against overvoltage, chemicals and abrasive products. Modbus, CANopen and CAN J1939 protocols are integrated.

Schneider Electric
www.schneider-electric.ca

Cordless wet/dry vacuums

Milwaukee has introduced two new cordless wet/dry vacuums for the professional trades. The 0880-20 28V wet/dry vacuums work on V28 lithium-ion batteries while the 18V 0880-20 wet/dry vacs are equipped with dual-battery connector blocks employing all 18V slide-on batteries, including



NiCad (nickel-cadmium) and lithium-ion. Offering a continuous run time of 16 minutes (with V28) and high suction power, the vacs are designed for portability (with onboard hose and stackable toolbox design). Both models include a crevice tool and nozzle in addition to such features as 2-gal capacity, 48W air power and a washable, high-efficiency (99.7% at 0.3µ) cartridge filter.

Milwaukee Electric Tool Corp.
www.milwaukeetool.com

Industrial network connectivity solutions

Ontor is now a distributor for the Anybus X-Gateway family, a product line of over 150 different products aimed at connecting almost every possible combination of two industrial networks, and supporting Fieldbus networks such as Profibus, DeviceNet, CANopen and CC-Link (as well as Industrial Ethernet versions). The X-gateways are designed for use in industrial automation plants, helping system integrators easily interconnect any two networks, thereby enabling more consistent information flow throughout the plant. The Anybus X-gateways have been designed for use in harsh industrial environ-



ments featuring standard DIN rail mounting, IP20 rating and 24VDC power supply and hazardous location classifications.

Ontor Ltd.
www.ontor.com

Remote monitor and alarm notification system

Sensaphone has introduced the 2000 remote monitor and alarm notification system, offering a programmable relay output that allows you to turn programmed devices On and Off, or adjust settings remotely using automatic or manual controls. Via custom voice phone calls, text messages, fax or optional, this new Sensaphone alerts facility managers to any critical environmental changes, including temperature (down to -85°C), pressure, excess humidity and intrusion. The unit has eight universal inputs that accept dry-contact sensors, thermistors, 4-20mA transducers, and pulse-count devices. It also features an optional Ethernet port to make data accessible from any computer within an organization's network, and can store 32,000 time-stamped records for local or remote retrieval.

Sensaphone
www.sensaphone.com



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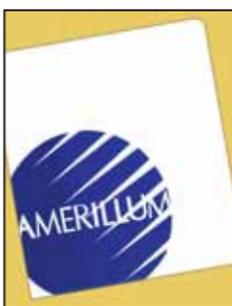
- Insulation resistance testing
- What is an insulation multimeter



In-/above-ground landscape lighting models brochure

Allscape has a 16-page full-colour brochure detailing its entire SL-33/34 collection of corrosion-resistant, compression-moulded, composite-material in-/above-ground landscape lighting fixtures. SL-34 can be placed partially in ground or above; the models are ETL/cETL wet listed and IP67 rated, suitable for commercial, institutional, light industrial and upscale residential direct burial and concrete-pour applications. The body of the catalogue is illustrated with combination product/application photos and schematic illustrations. The document provides complete application information, including light distribution patterns, advice for illuminating columns, trees, statues, etc.

Copies of the SL-33/34 brochure are available by calling Allscape at (714) 668-3660 or visiting www.allighting.com.



Fluorescent lighting products binder

Amerillum has published a new full-line product binder for 2008. Tabbed sections of the 2-in.-thick binder contain product cut sheets, professional product and application photographs, photometric data and complete technical data. Other sections show a series of retrofit kits, examples of customized products and high-efficiency reflector installation instructions.

Copies of the Amerillum 2008 Full-Line Product Binder are available to professional lighting specifiers, electrical utilities, corporate clients or distributors by calling (760) 727-7675 or visiting www.amerillum.com.

Downloadable enclosure data sheet

Stahlin Non-Metallic Enclosures, a manufacturer of glass fiber enclosure products, has made it easy for anyone needing enclosure data quickly in electronic format. You can now download summary information on the company's products—including the updated Clear Cover J Series Product Brief—from the company's website. The Stahlin JCC Series was developed for use in industrial or commercial environments where full viewing of all internal components is necessary.

For more information, visit Stahlin online at www.stahlin.com.

Video for batteries

Quick Cable Corp., a manufacturer of battery connectors, cables, accessories and safety products for commercial and industrial equipment, has released a three-minute corporate video highlighting its products, processes and markets served. The video, which can be selected to play in English or French, can be viewed on the company's website. Quick Cable says this video is a precursor to its introduction of QuickHowTo.com: a how-to video website that went live this spring.

Visit www.quickcable.com and www.quickhowto.com.

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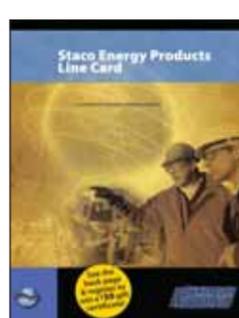
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Power quality solutions line card

A new full-colour brochure from Staco Energy Products highlights the company's tailored power quality solutions, which include power factor correction and harmonic filtering, single-phase and three-phase UPS, and voltage regulators and power conditioners. Information on the company's ability to engineer custom solutions to virtually any electrical power problems is also provided. Staco serves a range of industries including energy, robotics, manufacturing, communications and more.

Copies of the brochure can be downloaded at www.staco-news.com. Printed copies are available by calling (937) 253-1191.



LEED-compliant outdoor site lighting

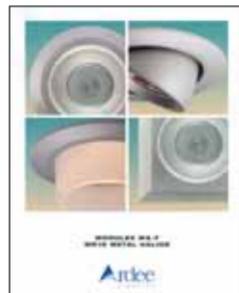
Beacon Products has announced the availability of a new brochure. The four-page, full-colour document highlights Piedmont, which is part of the Village Collection of interpretations of late 19th Century classic outdoor lighting designs with energy-saving modern optics. The brochure describes Piedmont's vandal-resistant polycarbonate dome with vertical metal supports running along its outside. The dome offers an optional illuminated cupola with a ball finial. Optical systems are energy efficient, Dark Sky friendly and LEED compliant. A table shows—in photos and ordering codes—complete lamping options, available optics, electrical options, and dome, base and mounting choices.

Copies of the Piedmont brochure are available by contacting Beacon Products LLC at (941) 755-6694 or visiting www.beaconproducts.com.

Online conduit, clamps and fittings shopping

American Conduit Clamps & Fittings (ACCF) has a new online shopping site. It promises competitive pricing, quick delivery and the convenience of online ordering for elbows, couplings, nipples and clamps. The site is ideal for contractors and end-users, says ACCF, who need timely on-the-job service to meet product needs in electrical, HVAC, plumbing and mechanical fastening applications. ACCF conduit fittings are manufactured in accordance with standards specified by UL, CSA and ANSI for galvanized rigid electrical metallic tubing and aluminum rigid conduit.

For more information and/or to start shopping, visit www.americanconduitclampsandfittings.com.



Metal halide downlighting brochure

Ardee has a new brochure for its ModuleX M3.7. The full-colour, four-page, illustrated document provides a comprehensive look at the range of performance optics of the recessed MR16-powered, energy-efficient downlight. This one low-scale unit in two models (which come in an array of trims, accessories and finishes) creates commercial, hospitality, residential and retail lighting designs for all specified applications. The heart of the unit is the new GE Constant Color ceramic metal halide (cMH) MR16 20-watt lamp.

Copies of the ModuleX M3.7 brochure are available by calling (704) 482-2811 or visiting www.ardeelighting.com.



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A look at continuous and non-continuous loads

Canadian Electrical Code (CEC) Rule 8-104 Maximum Circuit Loading is significant because it defines how electrical circuits and equipment must be rated, and provides limitations on the continuous loading of electrical equipment.

According to CEC, loads that are On for a long time—such as thermostatically controlled or other types of cyclical loads—are considered ‘continuous’. Rule 8-104(3) defines a continuous load as one:

- up to 225 amps that may continue for one hour or longer in any two-hour period, or
- that exceeds 225 amps and may continue for three hours or longer in any six-hour period.

Why is such a precise definition necessary and important? Well, because the suitability of electrical equipment for continuous loading depends upon testing, approval and marking for such use, we need to be able to recognize when the code considers an electrical load continuous to be certain we’re selecting the right electrical equipment.

As mentioned above, CEC provides a “line in the sand” beyond which electrical loading is considered continuous and the following special rules apply.

Rule 8-104(4). When electrical equipment (such as service boxes, fusible switches, circuit breakers and panelboards) is marked as suitable for continuous operation at 100% of its rating in amperes, the loads carried by such equipment must not exceed:

- 100% of the equipment’s ampere rating when conductor sizes are based on Tables 2 or 4 (conductors in cable or conduit), or
- 85% of the equipment’s ampere rating when conductor sizes are based on Tables 1 or 3 (single conductors in free air).

Rule 8-104(5). When any such equipment is marked as suitable for continuous operation at 80% of its rating in amperes, the loads carried by such equipment must not exceed:

- 80% of the equipment’s ampere rating when conductor sizes are based on Tables 2 or 4, or
- 70% of the equipment’s ampere rating when conductor sizes are based on Tables 1 or 3.

There’s also an Appendix B note for Rule 8-104; it specifies that equipment not marked as suitable for continuous loading at either 80% or 100% is considered suitable for 80% continuous loading.

You may have wondered why electrical equipment rated for continuous operation at 100% or 80% continuous loading must be limited to loads of 85% and 70% when using

conductors based on Tables 1 or 3. The answer: equipment standards require that testing and approval be carried out using conductors selected on the basis of Tables 2 and 4.

Connecting the same equipment with conductors sized in accordance with Tables 1 or 3 (as permitted by the code) will result in smaller wire sizes and therefore higher termination and equipment temperatures. A higher-than-permitted temperature may build up within the equipment enclosure. As a result of overheating, equipment life may be reduced by insulation breakdown, or the result may be equipment failure, arcing and fire hazards.

Rules 8-105(6) and (7) are there to remind us that the derating factors for continuous loading that apply to electrical equipment also apply to its wiring. The minimum wire sizes are always based on Rule 8-104 plus any other derating factors, such as voltage drop, which may be found in other CEC rules. When several derating factors apply, I suggest using the one that results in the larger wire size.

Electrical equipment loading is often a combination of continuous and non-continuous loads. For example, a 2000-ampere switchboard is marked for continuous operation up to 80% of its ampere rating. In this example, the selected wiring method is parallel copper R90 single-conductors and wire sizes based on Table 1. Question: Does CEC allow the above switchboard to supply a 1600-ampere load when one-half of the load is determined to be continuous and the other half non-continuous?

Answer: Since selection of the conductor sizes is based on Table 1, the switchboard must be derated to 70% for the continuous portion of the load and, therefore, one half of the 1600-ampere load is recalculated to $800 / .70 = 1143$ amperes (the minimum required loading capacity of the switchboard). The non-continuous portion remains at 800 amperes. The total permissible loading capacity then becomes $1143 + 800 = 1943$ amperes. This is lower than 2000 amperes and, as such, the equipment is acceptable. ☺

Les Stoch, P.Eng., is president of L. Stoch & Associates, specialists in quality management/engineering services. He is a member of PEO, OEL and IAEI, and develops and delivers electrical code and technical workshops for Dalhousie University. He also developed the Master Electrician training program and exam (Ontario) for the Electrical Contractor Registration Agency. Visit him online at www.lstoch.com.

Questions and answers compiled by the Electrical Safety Authority



Tackle the Code Conundrum... if you dare

So, you think you know the electrical code, eh? Well, we’ll soon find out if you’re an electrical code junkie or downright code-clueless. Take a look at the following questions and check your answers in June/July’s Electrical Business.

How did you do?

- 3 of 3 – Not only are you smart, you love to show off.
- 2 of 3 – You’re pretty smart, but you still missed one.
- 1 of 3 – Your understanding of these questions is not up to code.
- 0 of 3 – Did you come up with your answers by playing Eenie, Meenie, Minie, Moe?

Question 1

Cable assemblies located under airport runways, taxiways, aprons and roads shall be installed with a minimum mechanical protection of rigid conduit or a system of concrete-encased underground raceways installed a minimum of ___ deep.

- a) 300-mm
- b) 450-mm
- c) 600-mm
- d) 900-mm

Question 2

Each circuit leading to or through a gasoline dispensing pump shall be provided with a switching means that will simultaneously disconnect all ungrounded conductors of the circuit from the source of supply.

- a) True
- b) False

Question 3

Conductors of emergency systems and conductors between unit equipment and remote lamps installed in buildings of combustible construction in accordance with Rules 12-506 to 12-520 shall be permitted to be incorporated in a non-metallic sheathed cable.

- a) True
- b) False

Answers to Code Conundrum

Electrical Business April 2008

Q-1: Where primary windings of current and voltage instrument transformers are connected to circuits of 300V or more to ground, or where the transformers are on switchboards irrespective of the voltage of the circuits, the secondary circuits of the transformer shall be grounded.

c) True. Rule 10-116. Instrument transformer circuits. 1) Where primary windings of current and voltage instrument transformers are connected to circuits of 300V or more to ground, the secondary circuits of the transformer shall be grounded; 2) Where the transformers are on switchboards, the secondary circuits shall be grounded irrespective of the voltage of the circuits.

Q-2: 250 MCM copper conductors installed in a vertical raceway shall be supported at intervals not exceeding ___ metres.

B) 18 m. Rule 12-120 Supporting of conductors (and Table 21). 2) Conductors in vertical raceways shall be supported independently of the terminal connections and at intervals not exceeding those specified in Table 21 and such supports shall maintain the continuity of the raceway system without damage to the conductors or their covering.

Q-3: The vital and delayed vital branches in a healthcare facility shall be connected to the emergency power supply by means of one or more ___ transfer switches.

b) Automatic. Rule 24-304. Transfer switches. 4) The vital and delayed vital branches shall be connected to the emergency power supply by means of one or more automatic transfer switches.

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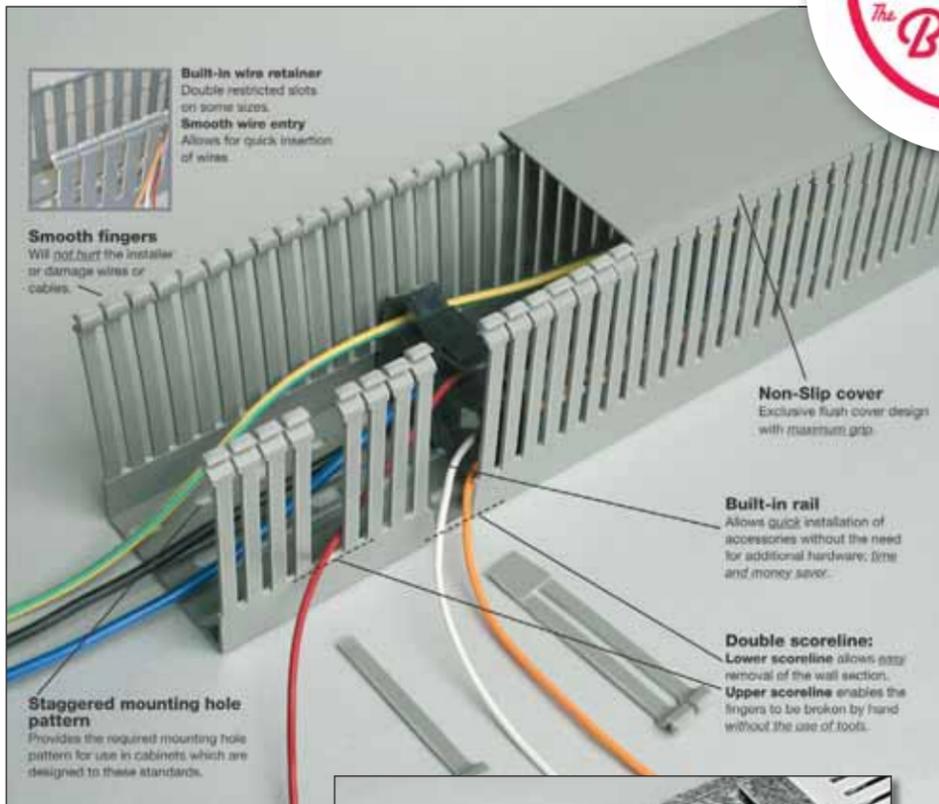
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